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ABSTRACT

The first section of this document presents an historical overview of the Laboratory of Educational Research (LER) Program of the University of Colorado during the years 1966 to 1973. This section describes the conception and objectives of the LER Program, its implementation, the nature of its faculty and students (including the employment pattern of those students who have graduated from the program), and its funding support levels. Section 2 describes the LER Training Model and discusses staff, university support, student quality and requirements, a detailed description of the program's curriculum, and various changes which have been made in the program. Section 3 is a summative evaluation of the LER Program. It discusses the effects of the program on the University of Colorado, its faculty and its students, effects on LER students, overall effects of the LER training program, and LER's strengths, weaknesses, and future. The questionnaire which was sent to the program's students for the purpose of evaluating LER and the interview form which was used in questioning staff are included as an appendix. The report also contains a number of tables which summarize the data collected during the evaluation. (Author/SE)

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THE LABORATORY OF EDUCATIONAL RESEARCH (LER)

1966 - 1973

I. Historical Overview

II. The LER Training Model

III. Summary Summative Evaluation of the LER Program

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Compiled By

Dr. William L. Goodwin

Fall, 1973

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NCERD Reporting Form — Developmental Products

1. Name of Product	2. Laboratory or Center	3. Report Preparation
The Laboratory of Educational Research (LER) 1966-73 Report (Historical Overview; the LER Training Model; Summary Summative Evaluation of the LER Program).	Laboratory of Educational Research, Univ. of Colorado	*Date prepared* 11/30/73 *Reviewed by* W.L. Goodwin

4. Problem: *Description of the educational problem this product designed to solve.*

To document the history of the Laboratory of Educational Research; to document the essential elements of the LER training model; and to provide an internal summary summative evaluation of the LER program.

5. Strategy: *The general strategy selected for the solution of the problem above.*

1. Data collection through archive search.
2. Data collection through questionnaire.
3. Data collection through structured interview.
4. Analysis, interpretation, and written recording of data thus collected.

6. Release Date: *Approximate date product was (or will be) ready for release to next agency.*	7. Level of Development: *Characteristic level (or projected level) of development of product at time of release. Check one.*	8. Next Agency: *Agency to whom product was (or will be) released for further development/diffusion.*
December, 1973	___ *Ready for critical review and for preparation for Field Test (i.e. prototype materials)* ___ *Ready for Field Test* ___ *Ready for publisher modification* _x_ *Ready for general dissemination/diffusion*	NIE

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9. Product Description: *Describe the following; number each description.*

- 1. *Characteristics of the product.*
- 2. *How it works.*
- 3. *What it is intended to do.*
- 4. *Associated products, if any.*
- 5. *Special conditions, time, training, equipment and/or other requirements for its use.*

1. A mineographed report providing a historical overview of the Laboratory of Educational Research, detailing the elements of the LER training model and evaluating, at an internal summative level, the LER training program.

2. Not applicable.

3. Provide information for other training agencies that train or are planning to train research and evaluation personnel.

4. Highly qualified research and evaluation personnel.

5. None.

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10. **Product Users:** *Those individuals or groups expected to use the product.*

Agencies and institutions engaged in research and evaluation training.

11. **Product Outcomes:** *The changes in user behavior, attitudes, efficiency, etc. resulting from product use, as supported by data. Please cite relevant support documents. If claims for the product are not yet supported by empirical evidence please so indicate.*

Not applicable.

12. **Potential Educational Consequences:** *Discuss not only the theoretical (i.e. conceivable) implications of your product but also the more probable implications of your product, especially over the next decade.*

Improved research and evaluation training activities.

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13. Product Elements: *List the elements which constitute the product.*	**14. Origin:** *Circle the most appropriate letter.*
Historical Overview	(D) M A
Description of the Laboratory of Educational Research training model.	(D) M A
Summary summative evaluation of the LER program.	(D) M A
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	D M A
	D M A
	D M A
	D M A
	D M A
	D M A
	D= Developed M= Modified A= Adopted

15. Start-up Costs: *Total expected costs to procure, install and initiate use of the product.*

Not applicable.

16. Operating Costs: *Projected costs for continuing use of product after initial adoption and installation (i.e., fees, consumable supplies, special staff, training, etc.).*

Not applicable.

17. Likely Market: *What is the likely market for this product? Consider the size and type of the user group; number of possible substitute (competitor) products on the market; and the likely availability of funds to purchase product by (for) the product user group.*

Uncertain.

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INTRODUCTION

This document contains three major components. The first section is a historical overview of the LER program over the initial seven years of its existence. The second section details the major elements in the LER training model, with several near-summative opinions on the adequacy of the elements. The final section contains a summary summative evaluation of the LER program.

Data sources for this document were twofold. First, information existing in the archives of LER, particularly several comprehensive evaluations conducted in past years, formed an exceptional base of data pertinent for this report. Second, new information was generated by soliciting vital opinions of all past and present LER students (the Questionnaire utilized is included as Appendix A) and by personal interviews with the two principal staff members (the sets of questions used are included as Appendix B). Some further elaboration of the procedures used with these new data sources, and the reasons for the omission of other potential data sources, is in order.

Procedures used in securing the opinions and vitae of LER students were standard in most regards, given this questionnaire-weary world. The questionnaire was mailed to potential respondents. It was long, and a series of follow-up requests was necessary. In all, 35 questionnaires were returned out of a possible 39, or 90 percent. Of the four non-respondents, two had left the program after less than one year's work -- one of these returned the questionnaire stating his willingness to respond, but also indicating feeling "out-of-it" in terms of most of the questions. Of the remaining two non-respondents, one sent in a vita, but indicated insufficient time to undertake the questionnaire, while the final non-respondent was not heard from at all. (In passing, it should be noted that several unsolicited comments about instrument design and the length of the questionnaire were received -- in all, a knowledgeable but salty set of barbs.)

The procedure used to interview the principal staff of LER, Ken Hopkins and Gene Glass, initially involved the generation of 38 questions, some of them containing multiple sub-questions, as given in Appendix B. (Both faculty also responded to selected items on the written questionnaire used for students.) The 38 questions were derived from previous instruments used in LER evaluations, from comments and responses of students to the present questionnaire, and from this writer's personal knowledge of the LER program. To the extent possible, the 38 items were paired and then one question from each pair was assigned, randomly, to either Question Set A or Question Set B. Ken Hopkins was interviewed alone and responded to Question Set A; then Gene Glass responded independently to Question Set B. Responses were recorded in written form by the interviewer. Then, with both men present, Ken Hopkins responded briefly to questions earlier answered by Gene Glass, and vice-versa. When responses to the same question were disparate, clarification and eleboration by the two men ensued. The entire session of interviews required six hours.

The reader might legitimately ask why other new data sources were not included in compiling this report. Given limited resources with which to support this venture, a conscious decision was made to focus on the past and present fellows and the two principal LER faculty as they seemed to represent the best information sources bearing on both the history of the LER and the components of the LER training model. Further, LER students were reasoned to be the most visible and viable product of LER -- and their vitae seemed likely to contain, in large part, the most appropriate bits of evidence bearing on summative judgments about the worth of the LER training program. Thought was given to sampling present employers of LER graduates, to sampling School of Education faculty opinion on LER, to content-analyzing and judging the research design quality of pre- and post-LER theses by School of Education doctoral students, etc. These possibilities, however, were rejected either because of

cost considerations or because of considerable certainty from previous evaluations, informal communication, and informal analysis that data thus generated would be favorable to LER, or for both reasons. The reflections and opinions of past students and the LER faculty, and the records of student accomplishment via their vitae and the archives, were considered to be the most appropriate data bearing on the principal elements of this report.

A final introductory note is in order. This writer, through general long-term association with the students and faculty of LER, is hardly as objective, unbiased, and detached as some would hope considering the topical content of this document. Therefore, I state openly my high regard for the LER training program and its mentors, and for the students that have been nurtured under it. At the same time, I have endeavored to report accurately and to interpret fairly data I have encountered. This data, or other data, is open for interpretation by other interested parties. Like the radio and television stations, I welcome the opposing views of responsible parties -- any such views forthcoming in non-profane written form will be cheerfully appended, once received, to this document.

I. HISTORICAL OVERVIEW

In time span, the history of the Laboratory of Educational Research is short. In terms of events and impact, however, the history of LER appears substantial.

Excellent progress reports and evaluations have been made of LER since its conception and have previously been submitted to Washington and, so, are a matter of record -- no attempt will be made to improve on those extensive documents. Rather, emphasis here will be on extracting key elements and reporting, in overview form, the event history of LER.

A. The Improbable Conception

Turn the clock back 10 years and examine the life and times and research emphasis of the University of Colorado School of Education in the early 1960's. Any sane observer asked then to predict the likelihood that a strong doctoral research training program would exist by the end of the decade would almost certainly have considered it highly improbable. The few courses offered by Education in the area were elementary and intermediate statistical methods, advanced educational measurement, evaluation of school systems and programs, and methods of educational research. In most of these courses, revision, if not wholesale revamping, was badly needed. Further, research was not a principal focus of the School of Education, and virtually none of the faculty "spoke computer." This is not meant as an indictment of the School of Education then, but is presented only to illustrate Colorado's posture in this regard (a posture quite typical for education schools, colleges, and departments nationwide) and to highlight the seemingly fallow, if not sterile, environment for what was to follow.

A key event precipitating the development of LER was a recommendation by the Education faculty's Committee on Research, Measurement, and Statistics for the 1964-65 Academic Year. The Committee encouraged the hiring of a staff member with specialization in educational research, measurement, and statistics. As a result, Dr. Ken Hopkins was hired and commenced his work at the University of Colorado in September, 1965.

During his initial year, Dr. Hopkins was instrumental in the development of two companion proposals -- one for research program development and one for support of research trainees. Two grants, subsequently awarded by the U.S. Office of Education, allowed the establishment of the Laboratory of Educational Research in September, 1966. The principal objective of LER, and related sub-objectives, are quoted from the December, 1965, grant request:

> The basic objective of the program, then, is to attract, train, and graduate persons with competence in, and dedication to, educational research that will enable them to stimulate and conduct research studies focused on important aspects of education. The more immediate objectives of the proposal are the following:
>
> 1. To develop and strengthen the specialized staffs in statistics, measurement, research design, and computer applications.
> 2. To develop the curricular capability in order that the necessary academic and professional experience for specialization in educational research is provided.
> 3. To provide the necessary relevant materials and equipment required for a comprehensive training program in educational research.

B. The Ensuing Implementation

Implementation might best be considered relative to each of the objectives quoted above. To a large extent, the "basic objective" has been maintained over the intervening time period. That is, new waves of research trainees have been launched at regular annual intervals. Most have been supported with fellowships

awarded under the training grant, while others have had support from elsewhere (e.g., NDEA) or have been self-supporting.

The three "immediate objectives" stated above have each led to substantial achievements. Their very nature, however, keeps them from being "permanently achieved," particularly as the LER has experienced a continuing growth in responsibilities and user-trainee expectations. An examination of each immediate objective will make clear the accomplishments as well as the evaluation of new needs in the same areas.

Staff development (Immediate Objective #1) primarily took the form of adding Dr. Gene Glass to the LER faculty in June, 1967. Dr. Glass and Dr. Hopkins have provided the continuing core nucleus of the LER faculty and have served as advisors for the bulk of the LER graduates. Other School of Education staff have also played supportive roles for LER:

(1) Dr. Harold Anderson served as a prime force in initiating and marshalling faculty sentiment for hiring a professor with research methodology as a specialization and an organization like LER; he has also assisted in the development and teaching of several courses in the program area.

(2) Dr. Blaine Worthen joined the School of Education faculty in August, 1969, and has provided several internship opportunities for the LER students, particularly in connection with the AERA Task Force Project that he directed. He also increased LER interest in the development of educational evaluation as a field and in training students to conduct educational evaluations. Dr. Worthen left the University in the summer of 1973 to assume a new post as Director of Research and Evaluation for the Northwest Regional Educational Laboratory.

(3) Dr. William Goodwin joined the School of Education faculty in August, 1970, and has provided some internship opportunities for LER students, primarily on evaluations. He directed the Evaluation and Development Design Grant that terminated in December, 1970, and that proposed an extension/elaboration of the LER training model.

Other School of Education staff, such as Dr. Ron Anderson, have helped LER by teaching program area courses. Further, faculty from other disciplines in the University have offered highly relevant courses for LER students, have served on their theses committees, etc. There is also reason to anticipate considerable

support for the LER program from Dr. Paul Bradley, who joined the School of Education faculty in August, 1973, after serving three years in the Center for the Study of Evaluation. (Dr. Worthen's departure left a position in research, statistics, and measurement open.) The increased distinction and maturity of the LER faculty is obvious from their present accelerated growth of mustaches and beards. Despite this fact and the foregoing discussion, it would be misleading to imply that staffing no longer represents a problem for LER. Demand -- for courses in the program area, for consultative assistance, and for individual assistance for students -- has far outstripped the faculty personnel resources available. The criticality of this need has been accentuated by Dr. Glass's limited availability during his 1973-74 University Creative Fellowship Leave of Absence. Continuing attention will necessarily be devoted to this need...in short, this first objective is, in some respects, still immediate.

Curricular capability (Immediate Objective #2) was dramatically enhanced in the initial years after LER creation. The Final Report for the Program Development Grant (Grant No. OEG-8-8-961860-4003(058), Project No. 6-1860) dated November, 1968, contains the pertinent summary reproduced below:

> [The grant] made possible the addition of several needed courses and experiences for research specialization in education:
>
> Educ. 604 - Experimental Design and Analysis I;
> Educ. 605 - Experimental Design and Analysis II;
> Educ. 608 - Internship in Educational Research I;
> Educ. 609 - Internship in Educational Research II;
> Educ. 610 - Internship in Educational Research III;
> Educ. 611 - Internship in Educational Research IV;
> Educ. 695 - Seminar in Research Methodology.
>
> In addition, two other courses were increased from two to three credit hours to allow greater depth and breadth of coverage:
>
> Educ. 480 - Elementary Statistical Methods;
> Educ. 511 - Advanced Educational Measurement and Evaluation.
>
> Two other courses were completely updated and revamped:
>
> Educ. 591 - Evaluation of School Systems and Programs;
> Educ. 600 - Methods of Educational Research.

The LER trainees were also instrumental in creating the need for an additional course in the Computing Science Department:

Comp. Sci. 451 - Computers in Behavioral Science

Even with this new capability, continuing attention has necessarily been given to articulation between courses and to modification of content (e.g., including computer applications in Educ. 480).

Materials and equipment (Immediate Objective #3) were likewise in substantial evidence by the date of the final report for the program development grant. A library of over 1,100 volumes of professional periodicals and reference books had been assembled, a statistics laboratory with six automatic desk calculators had been established, and faculty, student, and secretarial stations had been equipped. Further, the University had allocated 1,000 square feet of space in the basement of the McKenna Building for LER. This space was divided into the statistical laboratory, two faculty offices, a desk and filing cabinet for each trainee, a secretarial area, and a seminar-consultation area. Minor alterations, primarily improvements, occurred in the following year.

In January, 1970, LER was moved to its present location, the Education Annex. This is a converted brick house of considerable character and charm, approximately 250 yards from Hellems Annex that houses the main portion of the School of Education. In this facility, approximately 2,000 square feet are reserved for LER use. Four faculty and three secretarial offices are available as well as a large room (the "bull-pen") and two smaller rooms for trainee desks, filing cabinets, and some desk calculators. A small conference room is also utilized. Another small room off the main secretarial station contains a temperamental, sensitive copying machine, other desk calculators, and IBM keypunch, and the slowly expanding library. The current facility of LER, despite the non-rhythmic pounding of an antiquated heating system with two settings (off and roasting) and the surprises and uncertainties of a phantom janitorial service, has served LER well.

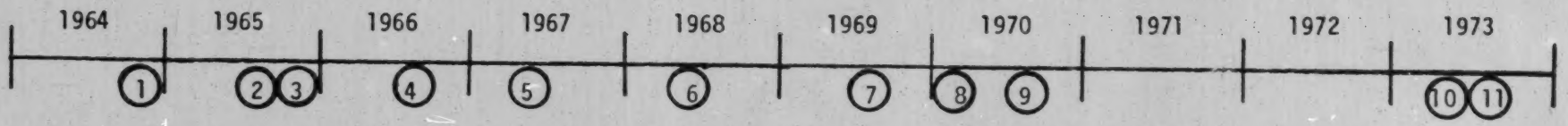
In summary, considerable progress has been made on all three immediate objectives, although continuing attention to them has been necessary, particularly for the first (staff personnel) and second (curriculum content). The basic objective, with its implications of repeatedly training new waves of students, remains in the forefront. Major historical events related to LER, most of them already discussed, are presented on the timeline in Figure 1.

C. Fellows and Fellowees

Of critical and obvious importance in any historical review of LER are the students who have undergone and been part of the instructional program. In Table 1, a listing of students who have successfully completed the program, and those currently active in LER, is given. Not listed are the relatively few students who did not complete the LER program.

As indicated in the table, 25 students have received the Ph.D. via the LER program. Nearly all these students had substantial interaction, during their LER years, with Drs. Glass and Hopkins. In terms of thesis advising, Dr. Glass advised about 50 percent of the LER completers, Dr. Hopkins about 30 percent, while other School of Education staff served as thesis chairmen for 20 percent of the students. In addition to the 25 Ph.D. recipients, two other students have completed the coursework and left LER, but have not completed the dissertation (both are working at National Assessment in Denver). The remaining nine students are active students in LER, as of the Fall semester, 1973.

The column in Table 1 identifying the number of positions or employers of former LER students is difficult to interpret given the relatively brief time that the students have been in the job market. In general, it would seem that the LER completers represent a moderately place-mobile group, but not excessively so. Only one LER graduate has moved three times since completing the program. In terms of type-of-position-mobility, LER completers are not very mobile. The



1. School of Education faculty's Committee on Research, Measurement, and Statistics recommends the hiring of a faculty member with research, measurement, and statistical skills.
2. Dr. Ken Hopkins begins University of Colorado affiliation.
3. Proposals submitted to USOE.
4. LER officially initiated (9-19-66) via USOE grants for program development and trainee support.
5. Dr. Gene Glass begins LER affiliation.
6. First LER graduates awarded Ph.D.
7. Dr. Blaine Worthen begins University of Colorado and LER affiliation.
8. LER moved to Education Annex.
9. Dr. William Goodwin begins University of Colorado and LER affiliation.
10. Dr. Blaine Worthen takes position with Northwest Educational Research Laboratory; federal funding of LER students terminates.
11. Dr. Gene Glass commences one-year University Creative Fellowship Leave of Absence.

Figure 1: Timeline depciting milestone events related to LER.

Table 1: LER Students, Thesis Advisors, Relevant Dates, and Present Positions

Student	Thesis Comm. Chairman	LER Entry Date	LER Leaving Date	PhD Completion Date	No. of Employers Since Leaving LER	Present Occupation	Present Location
1. Glenn Bracht	Hopkins	9-66	8-69	8-69	2	Assoc. Prof. (Ed. Psych.	U. of Minn.
2. Ann Brickner	Kalk	9-66	8-68	8-68	2	Dir. Eval. Serv. & Insti. Dev.	CTB/McGraw Hill, Monterey
3. Russ Chadbourn	Glass	9-66	8-68	1-69	2	Asso. Prof (Ed)	Georgia State U.
4. Ralph Hakstian	Glass	9-66	8-69	8-69	3	Asso. Prof. (Psych)	U. of Brit. Col.
5. Scott Harrington	Sease	9-66	8-69	8-71	1	Asst. Prof (Guide & Couns.)	U. of Nebr, Omaha
6. Percy Peckham	Hopkins	9-66	8-68	8-68	1	Asso. Prof (Ed Psy)	U. of Wash.
7. Robert A. Smith	Hopkins	9-66	8-68	8-68	1	Asso. Prof (Ed Psy)	U. of So. Ca.
8. Robert Mendro	Glass	9-67	8-70	8-72	2	Sr. Eval.,Sch Dist.	Dallas, Tex.
9. Mas Okada	Kalk	9-67	8-69	8-69	1	Sr. Prod. & Instr. Dev.	Southwest Reg. Lab
10. Arthur White	R. Anderson	9-67	8-69	8-69	1	Asso. Prof (Sci Ed)	Ohio State U.
11. Dan Bauman	H. Anderson	9-68	8-70	8-70	1	Asst. Prof (Ed)	SUNY, Fredonia
12. Richard Bennett	Hopkins	9-68	8-71	1-72	1	Asst. Prof (Ed Fou)	U. of Wyoming
13. Nancy Burton	Glass	9-68	8-71	5-72	1	Research & Anal.	Nat'l Assess.
14. Jim Collins	Glass	9-68	8-70	8-70	2	Asst. Prof (Ed)	U. of Mo., K.C.
15. Stephen Jurs	Glass	9-68	8-70	8-70	1	Asso. Prof (Ed. Res & Meas)	U. of Toledo
16. Jon Morris	Glass	9-68	8-70	5-71	2	Dir., Res & Eval; Asso. Prof (Ed Adm)	Twin Cities, Minn; U. of Minn.
17. Jim Sanders	Glass	9-68	8-70	8-70	2	Sr. Res. Asso.	NW Reg'l Lab
18. Arlen Gullickson	Hopkins	9-69	8-71	8-71	2	Asst. Prof (Ed. Psych & Meas.)	U. of South Dakota
19. Susan Oldefendt		9-69	5-72		1	Research & Anal.	Nat'l Assess.
20. Rory Remer	Sease	9-69	8-72	8-72	1	Asst. Prof (Ed Fou)	U. of Wyoming
21. Todd Rogers	Glass	9-69	8-71	8-71	2	Asst. Prof (Ed.)	U. of Ca.Riverside
22. Bev Anderson	Hopkins/ Glass	9-70	5-73	12-73	1	Res. Coord., Title VIII	Pine Ridge, S.D.
23. Norris Harms	Hopkins	9-70	5-73	12-73	1	Exer. Dev.	Nat'l Assess.
24. Larry Nelson	Glass	9-70	8-73	8-73	1	Asst. Prof (Ed)	U. of Otago, N.Zea.
25. Vic Willson	Glass	9-70	8-73	8-73	1	Eval; Asst. Prof (Ed Psych)	U. of Minn.
26. Lori Shephard	Glass	1-71	8-72	8-72	1	Res. & Eval Consultant	Ca. State Dept. of Ed.

Table 1 Continued

	Thesis Comm. Chairman	LER Entry Date	LER Leaving Date	PhD Completion Date	No. of Employers Since Leaving LER	Present Occupation	Present Location
27. Socrates Rapagna		9-71					
28. Bill Padia		6-72					
29. Don Phillips	Swadner	6-72	8-73			Research & Anal.	Nat'l Assess.
30. Marilyn Averill		9-72					
31. Roy Gabriel		9-72					
32. George Kretke		9-72					
33. Carlos Rodriguez		9-72					
34. Robert Stonehill		1-73					
35. Cathy Bower		9-73					
36. Karl White		9-73					

two major types of employment positions taken by LERers are academic positions in universities and evaluation, development, and analysis positions in regional laboratories, national projects, school districts, or state departments of education. Of the 10 former LER students who have left the positions they originally accepted, only three have changed career patterns, so to speak, by moving from academia into evaluation and development, or vice-versa. A fourth represents a borderline case, as he moved from an adjunct faculty position to a full faculty position.

Relatedly, it is of interest to note the pattern and trend of occupational emphasis that LER students have generated. In Table 2, the 25 LER Ph.D. recipients and the 2 completers without the degree have been grouped by period of leaving direct LER influence (that is, the "leaving date" column in Table 1) into Early (1968-1969), Middle (1970-1971), and Late students. Then, their present positions as given in Table 1 are coded either professorial (i.e., faculty in a university setting) or evaluation, development, and analysis. The two persons with joint appointments (in evaluation with adjunct rank on a university faculty) are weighted equally in the two type-of-position categories. The greater emphasis on professorial roles is apparent in the table, but equally in evidence seems a trend toward employment in non-professorial roles. The latter conclusion is obviously tentative, given the small n involved, yet such a trend would seem understandable given the restricted employment opportunities at present on university faculties.

Pattern and trend of occupational emphasis can also be examined in terms of total years of service by former LER students. Table 3 has been derived by using the Period of Leaving LER and Type of Position breakdowns as in Table 2, and by calculating years of service in each type of setting. The strange decimals reported result from the varying months of leaving by students and the

Table 2: Present Positions of LER Completers Categorized by Students' Period of Leaving LER and by Type of Position (as of December 31, 1973).

Period of Leaving LER		Type of Position: Professorial		Type of Position: Evaluation, Development & Analysis	
Early	1968	3	7 or 76%	1	2 or 22%
	1969	4		1	
Middle	1970	3.5	6.5 or 65%	2.5	3.5 or 35%
	1971	3		1	
Late	1972	1	2.5 or 31%	2	5.5 or 69%
	1973	1.5		3.5	
Totals			16 or 59%		11 or 41%

Table 3: Years of Service of LER Completers Categorized by Students' Period of Leaving LER and by Type of Position (as of December 31, 1973).

Period of Leaving LER		Type of Position: Professorial		Type of Position: Evaluation, Development, & Analysis	
Early	1968	16.00	33.33 years or 78%	5.33	9.66 years or 22%
	1969	17.33		4.33	
Middle	1970	14.47	19.47 years or 66%	5.53	9.86 years or 34%
	1971	5.00		4.33	
Late	1972	1.33	1.83 years or 29%	2.92	4.59 years or 71%
	1973	.50		1.67	
Totals			54.63 years or 69%		24.11 years or 31%

December 31, 1973, cutoff date for calculations. As in Table 2, years of service in joint appointments are weighted equally in the two type-of-position categories. When total years of service in each type of position are thus considered, the percentages reported in Table 3 do not differ dramatically from Table 2. Slightly over two-thirds of the 78 plus years of service by LERers have been in professorial pursuits. The apparent trend toward increased employment in non-professorial settings could, of course, rather quickly shift this balance.

A final means of visualizing the pattern of present employment of past LERers is presented in Figure 2. In that display, the current positions of 26 students are plotted geographically, by type of position (Dr. Larry Nelson's position in New Zealand is not shown). In the 1969-70 Progress Report and Evaluation of LER, a similar map (page 19 of the report) plotted the locations of the 15 students who had then completed the program. The information in Figure 2 can be compared with that in the 1969-70 report. The salient points are:

(1) The heartland of the Midwest, Illinois and Indiana, have been vacated by LER -- in 1970, there were four LER representatives there, now there are none.

(2) LER has experienced its first placement in the South.

(3) LER is twice as international as in 1970 -- a Canadian branch remains as before, while New Zealand has been added.

(4) LER has increased its representatives on the Western seaboard from three in 1970 to eight presently.

(5) The upper-Midwest and plains states are more extensively covered than previously.

(6) Seven recent placements have been made within 300 miles of the University (and six of these seven within 100 miles) -- only one such position was held in 1970.

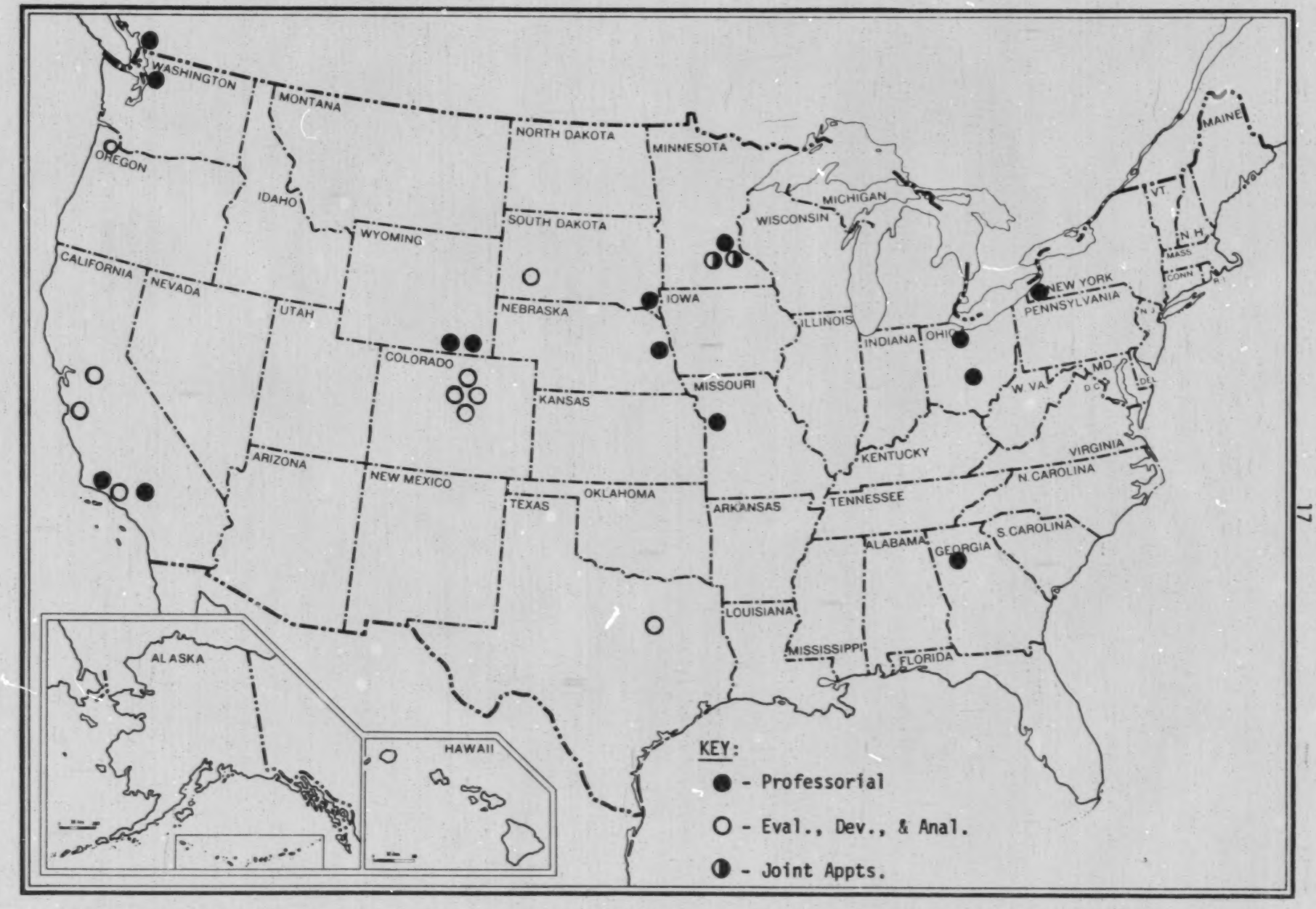


Figure 2: Present types and locations of positions held by LER completers (as of December 31, 1973).

D. Funding Support Levels

In this final section of the historical overview, data are presented on federal grant funding levels over the seven-year period from September, 1966, to August, 1973. These figures, while meaningful in their own right, do not convey all of the resource support that was channeled into LER. For example, the figures given do not indicate University support for the LER program (such as professional salaries, in-kind contributions, university fellowships and teaching assistantships and associateships for trainees, etc.), support for trainees from other sources (e.g., NDEA, some internship experiences, etc.).

The federal grants made directly to LER are listed in Table 4. They are classified in two ways: grants for training (1966-1973) and grants for program development (1966-1969). Further, the total grant award for each year and the accumulated grant awards over the seven year period are indicated.

It might be noted that the grant award for 1972-73 is of a different character. The total grant award was for $99,188; $8,000 of this is not reported in Table 4 because it was to support a visiting scholar not directly connected with LER. The remaining $91,188 was utilized primarily for trainee support (stipends, dependency allowances, tuition, etc.) in both research and evaluation, instead of concentration on just research as formerly was the case. Secondarily, the award was used to develop certain products centering on LER training program procedures. Exemplar products developed included an evaluation simulation exercise, programed materials on experimental design, this history and evaluation of LER, evaluation instruments for research training programs, etc. The grant award for 1972-73 actually ran from June 1, 1972, to August 31, 1973, so that product development could commence during the Summer of 1972.

Table 4: Grant Awards to LER and Accumulations by Type of Grant, September 1966 to August 1973.

Type of Grant Award	Year of Award (September 1 to August 31)*						
	1966-67	1967-68	1968-69	1969-70	1970-71	1971-72	1972-73
(1) Program Development	15,120	10,080	5,040	-	-	-	-
(Accumulation)	(15,120)	(25,200)	(30,240)	(30,240)	(30,240	(30,240)	(30,240)
(2) Training	47,300	49,900	56,200	52,400	52,400	26,300	91,188
(Accumulation)	(47,300)	(97,200)	(153,400)	(205,800)	(258,200)	(284,500)	(375,688)
Total (1 + 2)	62,420	59,980	61,240	52,400	52,400	26,300	91,188
(Accumulation	(62,420)	(122,400)	(183,640)	(236,040)	(288,440)	(314,740)	(405,928)

* Except for the 1972-73 award, which covered the period June 1, 1972, to August 31, 1973.

As can be noted in Table 4, the combined grant awards over the seven years accumulated to just over $400,000. The information contained in Table 4 is graphically presented in Figure 3. The relatively small amount granted for program development is easily ascertained in the figure, as is the dip in the grant award for 1971-72 and the somewhat unexpected increase for 1972-73. A full explanation for the 1972-73 increase would probably be better determined by scrutiny at the USOE end of the transaction. It can be noted, however, that when the relatively smaller 1971-72 grant and the relatively larger 1972-73 grant are averaged, the mean is quite close to the annual grants in preceeding years. Finally, both terminations of funds can be seen in Figure 3 -- termination of program development funds as of August 31, 1969, and termination of training funds as of August 31, 1973.

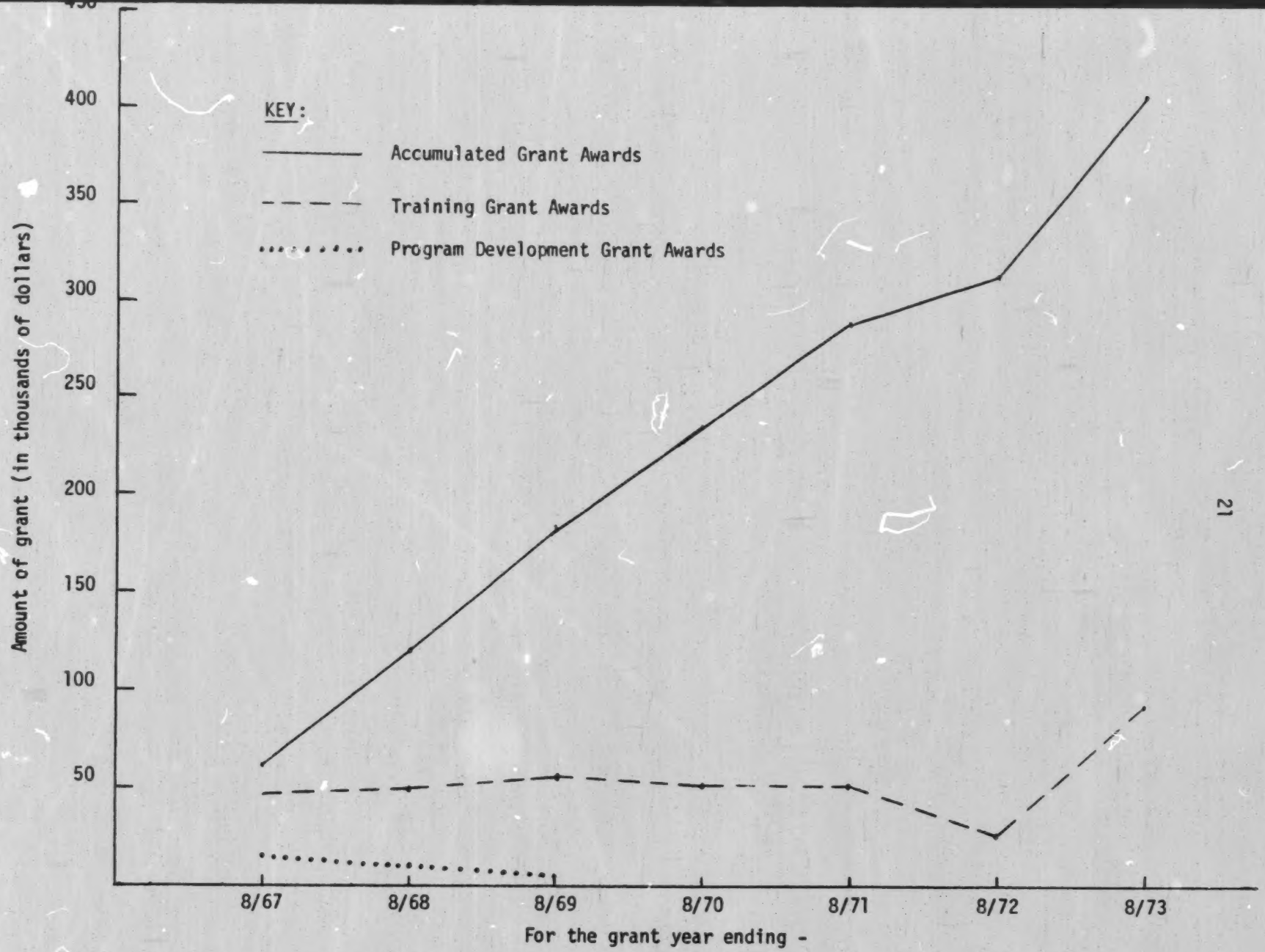


Figure 3: LER program and training grant awards: September, 1966, to August, 1973.

II. THE LER TRAINING MODEL

This section of the report contains a consideration of the major elements that make up the LER training model. Opinions and judgments of past and present LERers about the various elements are also integrated with the description. In a sense, then, some summative evaluation concerns are addressed in this section, while the final section of this report presents a summary of summative evaluation considerations.

No attempt is made here to describe every element in the training model, but rather only the major elements. Similarly, extensive description of elements selected is not undertaken, particularly when they have often been described in earlier LER reports. However, essential features of major elements are included in enough detail to permit the reader a reasonable conception of the topic under discussion.

An explanatory note on data sources is in order. In addition to LER archives, data from the instruments found in Appendices A and B are utilized in Sections I and III. References to specific items are provided in the text. Furtner, data resulting from the questionnaire in Appendix A was tabulated in four time periods for LER students completing the program:

(1) Early: Students completing in 1968 or 1969 (n=8 returns out of 9 possible);

(2) Middle: Students completing in 1970 or 1971 (n=10 returns out of 10 possible);

(3) Late: Students completing in 1972 or 1973 (n=7 returns out of 8 possible);

(4) Present: Students presently enrolled, but commencing prior to September, 1973 (n=7 returns out of 7 possible).

"Completing" was defined as finishing the course work and leaving LER, whether or not the dissertation was finished. This definition was adhered to to increase the probability that a time-group (like "early" or "late") was reacting to the

same LER experiences, at least in regard to time, when responding to the questionnaire. In most cases, this categorization on the basis of time did not lead to dramatically different results, and, therefore, an overall average is often all that is reported. On occasion, the time-categories will be used to report the data. Finally, note that the two students commencing in LER in September, 1973, Cathy Bower and Karl White, did not respond to the questionnaire.

A. LER Staff

A key element in the LER program is the professional staff. From a solitary member in September, 1966 (Dr. Ken Hopkins), the professional staff gradually expanded to four by September, 1970 (with the addition of Drs. Glass, Goodwin, and Worthen). As of Fall, 1973, LER staff is down to three with the departure of Dr. Worthen; possibly Dr. Paul Bradley will decide to affiliate directly with LER over the coming years.

In a very real sense, "professional staff" of LER can be most reliably interpreted in terms of Drs. Hopkins and Glass. Their continuing attention to the development and maintenance of the LER training model does not need documentation. As already noted (Table 1), together they have chaired the theses committees for 80 percent of LER graduates. Extensive interactions of several types occur between these faculty and the students. The students as a group clearly identified informal faculty-fellow interactions, during collaboration on faculty-initiated projects, as the single activity of most educational value to them (Item 1, Appendix A). Further, the productive, active nature of the careers of Drs. Glass and Hopkins, easily ascertained by examining their vitae, probably serves as a model for many LER students.

In terms of other support personnel within LER itself, the positive advantages of having a strong, tolerant, flexible, and non-flappable secretary is well-established. LER has been particularly fortunate in this regard: Linda Venter, Anita Dunlevy, and Nancy Gallagher have each served several years with

distinction. Since September, 1973, Viki (Victoria, for short) Bergquist, secretary for the Division of Foundations and Research Methodology, has also taken on a substantive support role for LER (schedule coordinating, paper typing, client consoling, etc.).

In general, after reviewing LER archives and questionnaire responses of past and present LERers, this analyst feels reasonably comfortable in identifying the LER professional staff as the critical, salient element of the training model. The only other element approaching the importance of the professional staff appears to be the quality of student input.

B. University Support and Location Within the University Setting

The supporting professional staff resource in the University of Colorado community is quite good. In psychology, mathematics, sociology, and other disciplines, LER students can find substantive courses and experiences. Within the School of Education, there have likewise been some professional staff inclined and able to work on an elaborated basis with LER students. The frequency of this latter event occurring, however, has not been as extensive as would be desirable. It is as if the historical legacy of limited research activities in the School of Education has not been overcome. Although some notable faculty member exceptions can be discerned in this regard and some overall improvement in the School of Education detected, the fact remains that only limited opportunities exist for LER students to become engaged actively in ongoing research activity with School of Education staff. Most LER students involved in research during their training become so in conjunction with the LER professional staff.

With regard to resources other than personnel, the University has supported LER quite well. With the foresight and wisdom to locate in Boulder, the University now presents an attractive posture to graduate students, and others, seeking relatively pure ecological and aesthetic settings. Maintenance of this

"advantage" remains to be seen, given the growing number of days that even the Eastern slope has had a serious smog problem. The University, as well as other agencies in the metropolitan Denver area, has also given home to a number of curriculum development and research projects that occasionally become internship sites for LER students.

More directly in terms of LER, the University has provided considerable program development support in the form of professional salaries, some teaching assistantship money, and physical space. The first home of LER was adequate given the initial small size of the program and subsequently was improved with the move to the present location in the Education Annex. LERers have found such facilities to be quite adequate (overall average of 2.2 on a 1 to 5, adequate to inadequate scale; item 17, Appendix A).

It is of note that LER's two physical locations have been facilities somewhat removed and remote from the School of Education proper. Without giving undue attention to this factor of isolation, speculation as to the probable disadvantages and advantages of such an arrangement is fun. The major disadvantage, at least in the perception of several School of Education faculty, is that the physical separation limits the accessibility to and awareness of, LER services -- this attitude was documented in the 1969-1970 LER evaluation report. This perception is not shared by LER professional staff. In fact, LER staff believe that the major result of being housed in the School of Education itself would be an increase in casual conversation and visiting with other education faculty, but a reduction in LER time resources available for productive consulting with clients (Question B-11, Appendix B). LER staff, and this observer, consider it unlikely that locating LER in the actual School of Education building would lead to any real increase in productivity or research by education faculty and students.

LER students were also queried on this issue (item 20, Appendix A). Although some variability in attitude is evident on this issue, LER students, on the average, neither strongly agreed nor strongly disagreed that closer ties be established between LER and the School of Education. This writer believes that the esprit developed by LER students, and in a sense the LER program itself, might not have occurred in the same intensity or form had the Laboratory been housed from its inception within the School of Education.

C. Recruitment, Requirements, and Student Quality

As indicated earlier, quality students exist as key elements in the LER training model. Strong students seem to have had the effect of requiring or, in a sense, of helping form, a strong program. Further, strong students have positively influenced and enriched the personal interactions taking place within LER.

LER in its early years attempted formal recruitment procedures. This effort was highlighted by the somewhat standard, colored brochure describing the program, admission criteria, application deadlines, etc., that was mailed to all the standard places, primarily institutions of higher education. In the opinion of LER staff, the yield from following these standard operating procedures has been small. They believe now, and have for several years, that their most effective recruitment "device" is a group of knowledgeable agents around the country who know LER well and who recommend the program to promising students seeking graduate study (question B-3, Appendix B). Over three-fourths of past and present LER trainees applied because an educational researcher or university professor had recommended LER, often after stimulating the student's interest in educational research and evaluation. Since the first year of LER's existence, there have been more excellently qualified applicants than traineeships.

The five major criteria for selection of LER students are indicated below:

(1) an undergraduate grade point average (GPA) of 3.0 or above and 3.5 in any graduate work completed;

(2) a combined Graduate Record Exam (GRE) score of 1250 or above, with a Quantitative sub-score of not less than 625;

(3) a background in mathematics;

(4) a commitment to a career in educational research; and

(5) strong letters of recommendation (particularly from professionals knowing well the LER program).

Although not all five criteria were met fully by all students admitted to LER (this was particularly true for the math background criterion), all students in competition for financial support were considered in terms of each of the five criteria.

LER principal staff were asked to indicate the extent to which the various criteria were important in determining which students would be admitted to the Lab (question A-4, Appendix B). They agreed that GRE scores were weighted heaviest, followed by undergraduate GPA. They were uncertain of relative weight for the other three criteria, but did indicate that a strong endorsement from a person knowledgeable about LER could mitigate considerably even the poor connotations associated with a GPA well below the established "minimum."

Principal LER staff were also questioned as to the possible undesirable effects of the high entrance criteria, such as the charge of "elitism" (questions A-5 and B-4, Appendix B). It can be noted that these entrance criteria are markedly above criteria for other graduate programs in education at Colorado and most other institutions (and even above those for most educational research and evaluation training programs in the country). LER staff were unaware of any

substantial negative effects of the high criteria, although they thought such a connotation might threaten some potential users. They saw no real substance to any elitism charge, and actually wished their program (as distinct from the admission criteria) might be vulnerable to such a charge, feeling it would be another basis for program esprit. One replied (somewhat facietiously, I believe), "If this is elitism, I don't ever want to see its opposite." There is no shortage of one-liners around the Lab.

The result of personalized recruitment and high entrance criteria can be ascertained by examining past and present LER students' performance on some of the criteria. (The data about to be presented do include Cathy Bower and Karl White; both commenced work in LER in September, 1973.) Relevant characteristic averages, as well as average age, are presented in Table 5.

The non-completers column in Table 5 refers to the five students who commenced the LER training program, but who terminated before completing. One left for personal reasons after only a summer in the program, one left to assume an even lower profile with regard to the draft, and the other three were not performing adequately and were counseled to seek more appropriate professional objectives. Of special note is the fact that four out of the five non-completers entered LER during the first 10 months of the program's existence -- the fifth entered in September, 1969, and terminated in May, 1970. This reduction in non-completers is quite dramatic. When asked if the non-completers had common characteristics (question A-1, Appendix B), LER staff indicated that they seemed to have had less commitment and interest in the career implied by the program. In Table 5, their lower Verbal GRE (and hence their lower combined GRE) and their younger age are conspicuous.

Other important features of Table 5 are the relative stability from period to period in most of the variables, the consistent advantage of a full standard

Table 5: Average Values of Characteristics of Students Admitted to LER by Group and Time Period

Characteristic	Non-Completers (1967-1970)	Early Completers (1968-1969)	Middle Completers (1970-1971)	Late Completers (1972-1973)	Present Students (To finish in 1974 or later)	Overall Average of Completers and Present Students
Verbal GRE	512 (n=5)	614 (n=9)	617 (n=10)	628 (n=8)	604 (n=8)	616 (n=35)
Quantitative GRE	710 (n=5)	716 (n=9)	706 (n=10)	716 (n=8)	698 (n=8)	709 (n=35)
Combined GRE	1222 (n=5)	1330 (n=9)	1323 (n=10)	1344 (n=8)	1301 (n=8)	1325 (n=35)
Undergraduate GPA	3.00 (n=5)	3.23 (n=9)	2.84 (n=9)	3.21 (n=8)	3.10 (n=8)	3.09 (n=34)
Age (at Admission)	25.2 (n=5)	32.7 (n=9)	27.5 (n=10)	26.5 (n=8)	27.3 (n=9)	28.5 (n=36)

deviation of the Quantitative GRE sub-test over the Verbal GRE sub-test, the nearness of the average undergraduate GPAs to the alleged criterion of 3.00, and the older entrance age of the early completers. Incidentally, the generally exceptional performance of students once admitted to LER is easily documented by referring to previous LER evaluation reports.

A final point, related to recruitment, that bears mention is program size. The proposal written for LER activity in 1967-68 implied that the fully-operational program would have 24 full-time students at a given time. This level of trainee enrollment was never reached -- the highest number of LER students at any point in time was 13 and occurred during the 1968-69 and 1969-70 academic years. With the physical and human resources available to LER, it is hard to imagine a program as large as 24 trainees. When asked about the likely consequences had a 24-student level been reached (question B-2, Appendix B), LER staff were hard pressed to imagine happy consequences except maybe justification for additional staff and greater service to School of Education faculty and students. Possible negative consequences envisioned included lowering entrance standards, losing esprit with so large a student contingent, and watering-down faculty attention for each individual student. The decision to limit enrollment may not have been a conscious one in the sense that the main limiting factor apparently was the availability of student-support funds -- very few LER students have been self-supporting during their traineeships. For the most part, students have seen the stipends provided as adequate (item 18, Appendix A), but recent inflation and the shift to job-oriented intern positions in Fall, 1973, appear to have made available stipends less adequate than previously. (On a 1 to 5 scale, adequate to inadequate, early LERers registered 1.5, middle 2.0, late 1.4, and present students 3.3.)

D. Experiences for LER Students

One can hardly describe the total lab experience for LER students in the space of a few pages. The attempt here will begin by reporting the ranking by all LER students of various activities in terms of their perceived educational value (items 1 and 2, Appendix A). These rankings, presented in Table 6 by time-period group, are accompanied by an indication summarized for all students of whether each activity was underemphasized (-), overemphasized (+), or emphasized correctly by the student (0). Rankings and emphasis perceptions of the two LER principal staff are also presented. Further, the overall student average rank and the average staff rank columns in Table 6 have had the resultant new rank (based on the average ranks reported) indicated just to the right of the slash line in those columns.

Several points can be made from the data presented in the table -- other "findings" and interpretations can be achieved by the reader. First consider differences between the several groups of students. Differences between the three groups of completers (early, middle, and late) are not particularly dramatic. It does appear, however, that perceptions of the educational value of consulting and self-initiated projects increases somewhat over the three time periods, while the value of brown sack seminars and fellow-fellow interactions is perceived to decrease. The early completers stand out for their high ranking of course work (1.8), while present students rank course work particularly low (7.5). In fact, the present student group ranks several categories substantially different than groups preceeding them. For example, present students rank comprehensive exams, faculty-fellow interactions, independent study or reading, and self-initiated projects as higher in educational value than do other groups. Their low ranking of the dissertation is difficult to interpret as most of them have not yet commenced that activity.

Table 6: Rankings by LER Students and Staff of the Educational Value of Various Program Activities, and Perceptions of Levels of Emphasis Placed on the Activities

Activity	Average Rank by Time-Period Group					Average Rank by LER Professional Staff*	Emphasis Perceptions							
							By Students				By Staff			
	Early Completers (1968-1969)	Middle Completers (1970-1971)	Late Completers (1972-1973)	Present Students (1974-?)	Overall Student Average*		+	0	-	N	+	0	-	N
1. Brown Sack Seminars.	6.3	5.9	8.3	8.1	7.2/9	10.0/10	3	22	5	2	0	2	0	0
2. Comprehensive Exams.	8.5	8.5	8.3	6.3	7.9/10	7.5/8	5	17	5	5	0	1	1	0
3. Consulting: Faculty-directed Projects.	6.1	6.1	4.1	5.9	5.6/7	5.5/6.5	2	19	10	1	1	1	0	0
4. Consulting: Off-the-street (Education students, etc.)	5.9	4.9	3.6	5.1	4.9/3	4.0/3.5	6	22	3	1	1	1	0	0
5. Course Work.	1.8	3.8	3.6	7.5	4.2/2	2.5/1.5	3	24	4	1	0	0	2	0
6. Dissertation.	4.8	4.2	5.3	6.5	5.2/4.5	2.5/1.5	1	18	7	6	0	2	0	0
7. Faculty-fellow Interactions (Informal).	3.6	2.9	3.3	2.5	3.1/1	5.5/6.5	3	14	14	1	0	1	1	0
8. Fellow-fellow Interactions.	4.3	5.3	6.7	4.4	5.2/4.5	9.0/9	2	24	5	1	0	2	0	0
9. Independent Study or Reading.	6.4	6.5	5.9	3.2	5.5/6	4.5/5	2	5	24	1	0	0	2	0
10. Self-initiated Projects.	7.4	7.0	6.0	5.4	6.5/8	4.0/3.5	0	9	21	2	0	0	2	0

+: Overemphasized by student. 0: Correctly emphasized by student.

-: Underemphasized by student. N: Not applicable.

* Average ranks are given to the left of the slash; then new ranks were derived from the average ranks given and reported to the right of the slash.

Overall student average ranks place the top activity in terms of educational value as faculty-fellow interactions. Faculty, on the other hand, rank that activity quite low in educational value (6.5). Large discrepancies exist between students and faculty on other categories. Students consider fellow-fellow interactions to have more educational value than do the LER staff, while LER faculty see greater educational value than students in comprehensive exams, the dissertation, and self-initiated research projects. By comparing this table to an earlier, similar-format one, produced in the 1969-70 evaluation (Table 4, page 31 in that report), it is clear that the average student rankings then and now are quite similar, while LER staff rankings have changed markedly on some activities (e.g., faculty-fellow interactions from 1 to 6.5, dissertation from 4.5 to 1.5, fellow-fellow interactions from 3 to 9, and self-initiated projects from 7.5 to 3.5).

Perceptions of emphasis placed on the activities by students in general seem as one might expect (and are close to perceptions reported in the 1969-70 evaluation, especially for students). Note that students as a group did not feel overemphasis on any activity, while one of the two LER principal staff indicated overemphasis on consulting by students. Students further indicated that they correctly emphasized most activities, considering only independent study or reading, self-initiated projects, and (to a lesser extent) faculty-fellow interactions to be underemphasized. The LER faculty agreed closely with student perceptions except for course work -- students perceived correct emphasis while faculty indicated underemphasis. (In 1969-70, faculty indicated correct emphasis on course work.)

Finally, in considering Table 6, let us examine briefly each of the 10 activities in order of listing as other data are available bearing on some of them.

(1) Brown Sack Seminars. Brown sack seminars seem to enjoy general disfavor, with hardly anywhere to go but up in terms of perceived educational value. In response to an interview question (item B-9, Appendix B), LER staff indicated one major difficulty was the paucity of real research problems that were available to examine and to build designs around during the seminar. They stated further that the major objective of the brown sack seminars had become personal and social rather than instructional and content-oriented. Although admittedly not critical for training, some support for them was expressed in terms of their being helpful for esprit and good settings in which to discuss value orientations.

(2) Comprehensive Exams. The second activity, comprehensive exams, was rated as low in educational value by both students and staff. A recent University of Colorado change has resulted in the elimination of first comprehensive exams that covered material in basic foundation areas. The rating by present students indicating a somewhat increased educational value in comps may be a manifestation of reaction to what formerly was second comps -- exams over one's area of emphasis or speciality. Before, given the wording of the question, one had to react to both first and second comps together.

(3) Consulting on Faculty-Directed Projects. The third activity in Table 6, consulting on faculty-directed projects, is rated relatively low in educational value by both students and faculty. This sometimes involves a substantial portion of a fellow's time (e.g., state assessment or AERA Task Force), but often is quite short in duration (Title III, ESEA, evaluations).

(4) Consulting "Off-the-Street." Activity 4 in Table 6 may take the prize as the "real sleeper" or "dark horse" of the original LER proposal written late in 1965. In that document, assisting faculty and students of the School of Education and other departments within the university on questions of research design, problem development, computer utilization, measurement, and statistical analysis is discussed as an objective, but so are a variety of other internship experiences

in a number of settings. Over time, "off-the-street" consulting has mushroomed and assumed increasing amounts of LER students' time, and other internship activities less. For example, in 1968-69, a grand total of 1,492 (Why does that number make me think of Columbus, Ohio?) hours of free consulting was provided to University of Colorado graduate students by LER. Slightly over half of these hours were spent with School of Education graduate students. Further, 473 hours of assistance were provided to university faculty.

Because of the increasing demand and press for this service, several related steps had to be taken. During the 1968-69 academic year, the internship expectation for LER students was reduced from 600 to 400 hours annually. Further, either Dr. Glass or Dr. Hopkins began sitting in on the initial interview with new clients, to speed the process and to increase the instructional aspects of the session for the LER students. These steps were taken to help maintain a better balance in the students' academic diet, and the first step was, allegedly, to encourage more accurate logging of internship hours. It became necessary to restrict the availability of the service to School of Education faculty and students, excluding requesting students from speech, audiology, communication, anthropology, etc. Further, attempts were made to reduce the tendency for LER students, normally in desperation, to run data analyses for clients rather than to explain procedures for the nth time in hopes that insight would strike the fumbling client. Related to this latter effort, LER staff reported (question B-7, Appendix B) less actual analysis of data by fellows now than during the early years of LER. However, off-the-street consulting continues to involve about one-third of the fellows' available time, data analysis still makes up over half of this consulting load, with the remaining consulting time split three to one, education students to education faculty (item 31, Appendix A).

Fairly consistently over the years, LER fellows have viewed the clients in these consulting sessions to be ill-prepared (3.7 on a 1 to 5 well-prepared to ill-prepared scale), somewhat grateful for the service, and strongly benefitted by it (item 14, Appendix A). As implied in the preceeding paragraph, LER students found themselves assuming too much of the client's data analysis work (item 15, Appendix A).

This service component is large and, in the view of at least one principal LER staffer, represents a serious weakness in the training model. What proportion of this consulting represents solid training for the student, as distinct from pure service as when the LER student repeats for this client, as he did for six previous clients, the meaning of the assumptions underlying ANOVA? Still, the relatively high ranking extended it by both students and staff (Table 6) suggests it is a valuable training element. In question, apparently, is not its value as a legitimate training activity, but rather the massive time requirement that it necessitates -- and the feeling that some of this time (particularly that which represents re-hoeing the same field) might be better spent on other activities. The evaluation of such a heavy time commitment for service-oriented off-the-street consulting might be turned around given the present level of awareness of its time-usurping character and the concurrent necessary to find financial support for students. This latter requirement has already caused a return, for some students, to the earlier conception of internship as work-activity for a research- or evaluation-related agency and, necessarily, a reduction in those students' available time for off-the-street consulting. A very real concern, however, is avoiding the low-training-yield internships all too common in the early experience of LER. Key factors in this regard appear to be having the intern working on a worthy problem and being directly monitored by a research-valuing and research-understanding supervisor (question A-8, Appendix B).

(5) Course Work. Course work, the fifth activity in Table 6, was ranked very high in educational value by both staff and students (with the exception of present LER trainees). Course work is usually taken to mean the LER "Core Curriculum" in research methodology and statistics. The Core Curriculum, in turn, is usually operationally defined as the courses listed below:

Education

480 (3)	Elem. Stat. Methods
503 (2)	Adv. Psych. Foundations of Educ.
505 (3)	Inter. Stat. Methods
511 (3)	Adv. Educ. Meas. & Eval.
516 (2)	Adv. Soc. Foundations of Educ.
591 (3)	Eval. of Sch. Systems & Programs.
600 (2)	Methods of Educ. Research
604 (3)	Exper. Design & Analysis I
605 (3)	Exper. Design & Analysis II
608 (2)	Internship in Educ. Research I
609 (2)	Internship in Educ. Research II
610 (2)	Internship in Educ. Research III
611 (2)	Internship in Educ. Research IV
695 (2)	Problems in Eval.
700	Master's Thesis
800	Doctor's Thesis

Psychology

587 (4)	General Statistics I
588 (4)	General Statistics II
691 (3)	Multivariate Analysis

Mathematics

481 (3)	Probability Theory

Further, it can be noted that this is not a hard core, but a flexible one. Courses are added and dropped based on evaluative data. Also, the courses taken by any one fellow depend on his objectives and interests. Finally, since about one-third of the fellows do not major in research methodology but in other substantive areas of education (e.g., educational psychology, guidance and counseling, science education, mathematics education, etc.), their emphasis on the flexible core curriculum is sometimes less pronounced.

Past and present LER students and current principal LER faculty were asked to evaluate the core curriculum and the emphasis on evaluation methodology in the curriculum (items 25 and 26, Appendix A). Their responses appear in Table 7. One is immediately struck by the great similarity across the time-period groups. In terms of the first four items, the early completers group viewed the core curriculum in the most favorable manner (that is, perceiving a balance on the amount of math included and amount of freedom allowed, reporting a near-balance on the theoretical-applied continuum, and rating the design of the curriculum higher than all later groups). Faculty perceptions were close to student perceptions although faculty reported the curriculum less well designed than students did and also felt more strongly the lack of emphasis on evaluation.

In interview questions (A-11 and B-13, Appendix B), LER staff reported a gradual trend in the curriculum and experiences toward evaluation, but not at the expense of having to reduce emphasis on other portions of the curriculum. The staffers agreed that students were taking fewer offerings in the behavioral sciences now than previously. They disagreed, however, as to whether the curriculum allowed too little or too much freedom and whether a return to more firm, structured course requirements was wise or warranted. The disagreement extends to independent study, with one professor proclaiming unilaterally the need for more structured, guided, and documented independent study. This debate likely will continue.

Another point might be presented before leaving the topic of course work -- some fellows express the need for expertise in a content area (in addition to research methodology). Of course, about one-third of LER grads do have content area emphases and sophistications, such as those majoring or garnering an additional major in educational psychology, guidance, etc. In the original proposal establishing LER, it is clear that the intent was "to emphasize both the

Table 7: Evaluation of Core Curriculum and Emphasis on Evaluation Methodology by LER Students and Staff

Item							Average Rating by Time-Period Group					Average Rating by LER Professional Staff
							Early Completers (1968-1969)	Middle Completers (1970-1971)	Late Completers (1972-1973)	Present Students (1974-?)	Overall Student Average	
Too Much Math	1	2	3	4	5	Too Little Math	3.0	3.7	3.6	3.3	3.4	3.5
Too theoretical	1	2	3	4	5	Too Applied	2.9	3.0	3.1	3.3	3.1	3.0
Poorly Designed	1	2	3	4	5	Well Designed	4.4	3.8	4.1	3.6	4.0	3.0
Too Little Freedom	1	2	3	4	5	Too Much Freedom	3.0	3.1	3.3	3.3	3.2	3.5
Too Much Emphasis on Evaluation	1	2	3	4	5	Too Little Emphasis on Evaluation	3.5	2.9	3.8	3.0	3.3	4.0

substantive and methodological aspects of research" (p. 10). This intent has not been fully met, in large part due to the limited time available for LER fellows to pursue a substantive content area while still mastering the research methodology area. This lack is apparently felt deeply by only some LER students and can be ascertained by a questionnaire response (item 33, Appendix A). Asked whether they felt inadequately trained in a specific discipline or content area, students responded on the average at 3.4 on a 1 to 5 scale from "to a great extent" to "not at all." Going to individual responses, only one LERer responded with a "1", while nine others indicated "2."

LER staff agree that lack of a content area sophistication other than research methodology can be a detriment to some students, and they do recognize such preparation as a LER program objective. However, they feel two conditions would be necessary to allow real improvement in this area. First, they indicate a need for additional educational faculty, with on-going research interests in instruction, educational psychology, etc., who could provide nurture and guidance for LER students in such content areas. Second, they believe that students would have to be willing to spend additional time as a student to learn and integrate the new content emphasis and material. How likely these two conditions are to occur is difficult to say. LER staff do believe, however, that former students who suggest that lack of a content area specialty is keeping them from publishing research may often be erecting a strawman to rationalize their own limited research productivity.

(6) Dissertation. The dissertation is viewed as having more educational value by LER staff than by past and present LER students. In general, past students see dissertation guidance by Drs. Glass and Hopkins as substantial and appropriate. For example, students rated their guidance 3.3 on a 1 to 5 scale from restrictive

to vague (item 5, Appendix A). Other advisors, incidentally, either only partially affiliated or unaffiliated with LER, were rated 4.5 on the average on this same item.

It is appropriate here to discuss the interdisciplinary aspects of the LER program, as some relevant elements occur at the dissertation stage. (Likewise, this topic could have been addressed under the preceeding section on course work.) The intent of the original proposal was to provide a rich interdisciplinary exchange for students in terms of course work, informal seminars, and dissertation efforts. This was achieved to a substantial degree in the area of dissertations, particularly with participation by psychology professors, but less recognizable with regard to course work. In a sense, the interdisciplinary aspects of the LER program seemed to be more an expectation desired and sought rather than a spontaneous, viable happening occurring in the program. In sum, however, interdisciplinism in LER reached levels unusual for doctoral programs, but still fell below the rich, fertile exchanges originally envisioned.

(7) Faculty-fellow Interaction. In Table 6, this activity was ranked highest, by past and present LER students, in terms of its educational value for them. Consistent with this high ranking were student responses on several questions (items 3, 4, and 6, Appendix A). Drs. Hopkins and Glass were rated as easy to see on professional matters (4.7 on a 1 to 5 scale from "difficult to see" to "easy to see"), as providing neither restrictive nor vague course, degree, and dissertation guidance, and as providing "a great deal professionally" to students (1.25 on a 1 to 5 scale from "strongly agree a great deal professionally was provided" to "strongly disagree").

Many types of activities can occur under this category. For example, explanation by faculty of School of Education and Graduate School requirements could, and on occasion does, occur. Students, by the way, often are directed by

faculty to other students to get "requirement questions" answered; this practice evidently is not too offensive to students (on item 7, Appendix A, students neither strongly agreed nor disagreed that LER faculty should know more about such requirements). Another example of faculty-fellow interactions would be work with non-LER faculty on faculty-initiated projects -- LER students, on the average, reported knowing well two to three education professors with whom such efforts might be undertaken (item 19, Appendix A). However, for many reasons previously cited, this orientation of students when ranking the 10 activities in Table 6 would have been unlikely given the low frequency that such events occurred.

Most likely when past and present LERers made their rankings, they had in mind direct interaction between themselves and Drs. Glass and/or Hopkins on professional and methodological concerns. Clearly there is not enough of these two men to spread too far in this regard. Five or six quite active LER graduate students are advised by each man -- this in and of itself is a large time commitment. Further, each man has spent considerable time with non-LER students, both during initial client-intake interviews and in other sessions assisting them on their dissertation planning. Further, each man has consulting activities with faculty, with agencies nationally, and the usual university teaching, research, and other service obligations (e.g., committee-work) to meet. Still, from all the data this evaluator has been able to find, collect, and interpret, the extent of direct faculty-student interaction for LER students apparently exceeds such interaction opportunities in most other doctoral programs in the university.

Interaction between LER faculty and LER students is not just a matter of putting aside a certain number of hours to meet together (item B-8, Appendix B). Rather, substantive issues or tasks are usually the focus of such encounters. Further, there are issues surrounding the nature of how such interactions should proceed. For example, should faculty take the lead role, thus possibly increasing

the "efficiency" of the interaction in terms of information imported, but also increasing the likelihood of student dependence upon the faculty member -- or should faculty be tolerant of inefficiency in such a setting, opting for such a posture to increase the training potential of such sessions for students? Such "inefficiency," of course, lengthens the time commitment for faculty.

In sum, this activity blends and integrates and places in interaction the two key components in the LER training model -- that is, the LER students and the principal LER faculty. The high ranking given it by students and the plunging ranking given it by faculty (as plunging compared with rankings four years earlier) suggest that careful attention needs to be given to this activity at once. Its maintenance and viability appear critical for the success of the LER training model. Interestingly, one LER professional staff member indicated his hope that such interactions could lead to even more faculty-student collaborative research. Such a practice was more obvious in the earlier years of LER than recently, and obviously would require even additional faculty and student time commitments above the present high level.

(8) Fellow-fellow Interaction. Activity 8 in Table 6 is also important, particularly in the perception of students. Three questions (items 10, 11, and 12, Appendix A) dealt with fellow-to-fellow interactions. Past and present students indicated much orientation of new fellows by older fellows (1.8 on a 1 to 5 scale from "a great deal" to "very little"). Help was extended between fellows particularly in regard to client problems and course planning, and (to a substantial but lesser extent) on actual course work, degree requirements, and professional problems. In all, fellows perceived informal interaction between themselves as quite valuable (1.4 on a 1 to 5 scale from "valuable" to "not valuable").

(9) Independent Study or Reading. This activity was ranked of moderate educational value by students and staff. Note also the high incidence of students and staff perceiving independent study and reading as underemphasized by students.

One wonders why present students ranked it so much higher than previous students or LER faculty. Possibly, the age of independent study ("everybody do your own thing") is upon us. More likely, present students still have hopes of pursuing independently many topics, while past students and faculty are more aware of how rarely time is found for such independent activities. Intents seem to far exceed actual transactions in regard to independent study and reading.

(10) Self-initiated Projects. Self-initiated projects, like independent study, were perceived by both faculty and students as underemphasized by students. Faculty ranked such projects considerably higher in educational value than did students. One interview question (item A-9, Appendix B) provided related data. Both LER principal staff were receptive to the idea of requiring LER students to conduct a small research project from conceptualization to completion. Recalling the formerly-funded research mini-grants, they indicated that the experience of following a similar model, possibly on a reduced scale, might prove quite educational for students. (Relatedly, LER staff did not see as particularly necessary training LERers to develop and write proposals per se -- this was considered a fairly routine skill fairly easily learned if the demand arises; question B-15, Appendix B.)

It is appropriate at this juncture to introduce another potential experience for students. Although not listed explicitly in Table 6, the experience of publishing is implied by activity 10. No attempt will be made here to treat the many arguments and facets thereof that have revolved for decades around the "publish or perish" issue (or, as it was known long before the invention of the

printing press, the "chip or ship" issue -- I couldn't resist putting that in, as I am comfortably aware that I will probably be the only reader ever of this page). Rather, the potential training value of such an experience will serve as a focus for discussion.

Anyone hoping for a clear resolution of this training value of publishing might as well skip this paragraph. In fact, neither the LER students nor the LER staff are of one mind on this issue. When asked to what extent it was important for LER students to publish formal papers <u>during</u> their training program (item 39, Appendix A), averages on a 1 to 5 scale from "to a great extent" to "not at all" were 1.9 for early completers, 1.6 for middle, 2.1 for late, and 3.0 for present students. On the same item, principal LER faculty responded 1 and 3. Thus, the training value is agreed upon, but not whether the value is great or only moderate.

The evaluator had some visions of partially answering this question via a careful vita by vita analysis, looking at publications during the LER student years and then at publications since. The question to be addressed was whether those students publishing extensively while Lab students continued to be productive later, as compared with career publication records of persons who did not publish extensively as Lab students. So much for good intentions of the evaluator. My subsequent analysis would suggest that high publication productivity as a LER student tended to be associated with high publication productivity in later career work, but the analysis suffers from several problems. First, nearly 30 percent of past LER students sent no vita at all (which in and of itself is possibly a general indication of lack of inclination to publish). Second, those vita that were received were not "standard" -- some were up-to-date, others were not, some included a meticulous account of publications of all types, others did not, etc. Third, the back-up questionnaire item was often

selected as the "item most deserving of not getting answered" by several of those respondents who had not provided a vita, while other respondents merely referenced their vita which sometimes was current and complete but other times was not. To a large extent, then, the question remains unanswered.

Moving back to the previous point of the merit of LER students conducting complete mini-research projects while in training, it can be noted that such an experience would presumably include publication and therefore might encourage later productivity. At a more basic level, however, it would appear that this general issue might be addressed by present LER faculty and students. Of all student groups, the present "crop" ascribes least importance to publishing while still students -- with two faculty, one apparently in agreement with the students and one not, the debate should be lively. It might be possible, after extended discussions, to list under what conditions publication while a student should be encouraged (e.g., for those planning a university-based career, etc.).

One final experience for LER students deserves special note -- teaching. The opportunity to teach in a university setting is considered by LER staff as very important, especially for students planning on a college or university teaching career (item A-10, Appendix B). It exists as an important element for such students, both in terms of their learning and their subsequent employability.

At the University of Colorado, it has become increasingly difficult of late for students to receive full responsibility for teaching a class, particularly if the class is offerred for masters or doctoral students. Opportunities do exist to tutor and to assist professors in conducting a class. Presently, some students are afforded the opportunity to teach the elementary statistics course (480) and the basic educational measurement course (412). It would seem important to keep this experience available for all students desiring it.

E. Duration of Training

The length of time that individuals are directly affiliated with LER in a student status can be derived from Table 1 presented earlier. The period is usually two or three years, usually depending on whether the entering student has or has not already obtained a masters degree.

Some past students in their questionnaires indicated a feeling of rushing through their program to meet staff expectations. Further, they believed an additional year in LER might have been beneficial to them, by allowing more work in a subject content area, permitting initiation of publications, etc. Whether these good things would have occurred or not is uncertain, for, in response to concerns of early completers, LER staff began encouraging entering students to spend three years in LER, whether or not the Masters degree had been earned previously. Even now, however, the concerns of "rushed" fellows indicated above seem often to be expressed by "unrushed" fellows. Possibly this is another paradox of nature -- no matter how long the doctoral training program is designed to take, it will seem one year too short to students.

A related topic is the attitude toward, and frequency of, leaving LER without the dissertation being completed. The attitude of LER staff is clear enough -- they are against the practice. The frequency of leaving before finishing the dissertation is expressed in Table 8; several attempts at plotting the data did not result in improved insights about the practice and thus are not included. Although one is tempted by the 1973 data to conclude that the early-leaving phenomenon is on the increase, this is probably unwise given the small n involved. Further, 1971 appears not so very different from 1973. Additionally, the time period between leaving and completion is also of interest, and two of 1973's early-leavers completed the Ph.D. before the calendar year ended. However, the data may be indicative of a trend, particularly with the reduced availability of student support funds, the dramatically increased cost of living,

Table 8: Number and Percent of Students Leaving LER Before and After Ph.D. Completed.

Year	Leaving LER After Ph.D. Completed	Leaving LER Before Ph.D. Completed *
1968	3 (75%)	1 (25%)
1969	4 (80%)	1 (20%)
1970	4 (67%)	2 (33%)
1971	2 (50%)	2 (50%)
1972	2 (67%)	1 (33%)
1973	2 (40%)	3 (60%)
Totals	17 (63%)	10 (37%)

* All persons listed in this column have completed the Ph.D. (as of 12/73) except one student leaving LER in 1972 and one student leaving LER in 1973; see Table 1.

and the availability of close, professional enrollment (three out of the past four early-leavers have been employed at National Assessment in Denver). This index bears watching.

F. Placement after Training

Many aspects of placement have already been addressed, such as the type of position taken (Table 2), the years of service by type of position thus far provided (Table 3), and the geographical location of positions by type (Figure 2).

Past and present LER students were asked to indicate by ranking whether their occupational preference tended toward development, evaluation, or research (item 29, Appendix A). The results, presented in Table 9, show a clear preference for research, then evaluation and development. Support for evaluation careers may, however, be on the increase.

Former and present students also ranked possible occupations and gave their perceptions of how LER staff would rank such occupation settings in terms of appropriateness for LER graduates (items 27 and 28, Appendix A). Their estimates of LER staff ranks were amazingly accurate, so much so that the actual data are not reported for fear that collusion might be charged. The preferences of LERers themselves are reported in Table 10 by time-period group. Of note are the rather high ranking given research and teaching in a small college or university, and the low ranking given a coordinator's job in a state department of education. Even more important, particularly considering the trend toward less employment of LER grads in professorial roles (Table 2), is the clear preference given to professorial positions. In Table 10, research and teaching in a large and small university are ranked 1 and 2 by all groups, while the early completers, present students, and all students on the average rank "teaching only in a university" as 3 (and the other two time-period groups rank it a near-third). These data

Table 9: Average Rank of Occupational Areas by Time-Period Groups of LER Students

Occupational Area	Average Rank by Time-Period Group				
	Early Completers (1968-1969)	Middle Completers (1970-1971)	Late Completers (1972-1973)	Present Students (1974-?)	Overall Student Average
Research	1.8	1.1	1.1	1.3	1.5
Evaluation	1.9	2.2	2.3	2.6	2.3
Development	2.4	2.7	2.6	2.3	2.5

Table 10: Average Rank of Occupations by Time-Perios Groups of LER Students

Occupation	Average Rank by Time-Period Group				
	Early Completers (1968-1969)	Middle Completers (1970-1971)	Late Completers (1972-1973)	Present Students (1974-?)	Overall Student Average
Research and development in a private or quasi-public firm (e.g., National Assessment, ETS, SRI).	5.5	5.1	5.0	4.5	5.0 (4)
Research and development in a Regional Laboratory.	4.8	5.3	6.1	5.7	5.5 (5)
Research and development in an R & D Center.	5.7	5.7	6.4	5.0	5.7 (6)
Research and teaching in a small (less than 4,000) college or university.	3.0	2.5	2.9	3.3	2.9 (2)
Research and teaching in a large (10,000+) university	2.3	1.9	1.3	1.7	1.8 (1)
Research director in a large city school system.	4.9	5.1	6.4	7.7	6.0 (7)
Coordinator for a state education department.	7.1	7.0	6.7	8.7	7.4 (9)
Research on an independent, free-lance basis (i.e., self-employed researcher taking contracts of interest, but not one who is university -- or organization -- based).	7.4	7.1	5.1	4.7	6.1 (8)
Teaching only in a university.	4.4	5.3	5.1	3.8	4.7 (3)

would suggest that the recent trend toward employment in non-professorial settings is due more to the job market than to any dramatic change in graduating student interest. Interest in employment quite often takes precedence over interest in interests.

Finally, with regard to placement, it might be noted that LER professional staff believe that completing LER students have been placed well (question B-5, Appendix B). The name of LER, and the reputations of Drs. Glass and Hopkins, have not hindered or been detrimental to the placement of any fellow -- in fact, they have probably been instrumental in securing many placements for fellows.

G. Changes in the LER Training Model over Time

A final topic rounds out this description of the LER training model. Several changes have occurred in the LER training model in the course of its seven-year history -- many of them have already been alluded to. The primary ones are listed below (not noted are the obvious early changes due primarily to the program development grant, for example, the creation of new courses):

-- Shifting emphasis from internships of the apprenticeship-variety with applied agencies (e.g., public schools, state department of education) to consultation with individuals and groups doing research projects ("off-the-street" consulting).

-- Reducing the annual internship requirement from 600 to 400 hours per student.

-- Reducing the number of required "core" courses, placing them in an elective category.

-- Having a faculty member sit in on client intake interviews.

-- Increasing the involvement of LER students on faculty-led projects (e.g., State Assessment, Title I, Task Force, etc.) and evaluations.

A number of lesser changes of an administrative nature also occurred (e.g., making a fellow the coordinator of client appointments, making another the coordinator of brown sack seminars, etc.).

Four important features of the primary changes can be noted. First, they are not earth-shaking or particularly revolutionary. They seem to be well-considered responses to fairly well-documented problem areas. Second, they have been of long-standing. That is, the change once implemented has persisted. (However, the change involving a shift of internships from applied agencies to off-the-street consulting may change again, as previously noted.) Third, the changes are directly related to the student experience. Fourth, and significantly, the changes have primarily been the result of evaluation data, particularly from students. The change that is the exception to this general pattern is the increasing involvement of students on faculty-directed projects.

The earlier statement that these changes have been neither earth-shaking nor revolutionary does not imply that other more dramatic changes have not been considered. For example, three outside consultants (Art Lumsdaine, Sam Messick, and Sam Sieber) evaluated LER in 1971. One proposal they put up for consideration was the possibility of imbedding the training of LER students within a large-scale, on-going research project -- learn to be researchers by doing research was the basic suggestion. The LER professional staff rejected this notion then, and still do. Although noting the potential student financial support advantages of a large-scale <u>continuing</u> research project, LER staffers believed then (and now) that variety of experiences for trainees would be substantially reduced and students would be subjected to mainly low-yield experiences from a training standpoint (question A-8, Appendix B). Past and present LER students are of the opinion that they would be less well-trained if LER had been focused around a continuing large-scale research project, 4.1 on a 1 to 5 scale from "better" to "poorer trained overall" (item 32, Appendix A).

This positive analysis that describes LER change policy as relaxed, considered, and data-based is not meant to imply that analysis should cease or that

significant changes should not now be considered. In fact, this evaluator feels that the opposite is true. Given the changing job market situation, the reduced availability of financial support for students, the changing perceptions (and possibly interests) of LER principal staff, and other factors, this observer believes that this is an opportune time to re-examine the LER training model, component by component. It is also an appropriate time to re-examine the original objectives of LER to ascertain their present viability, merit, and relevance.

III. SUMMARY SUMMATIVE EVALUATION OF THE LER PROGRAM

As stated in the introductory section of this report, this writer is not unbiased in so far as LER is concerned -- rather, I see it as an effective, substantial program of high merit. Therefore, the reader is instructed that this final summary section is best considered an internal summative evaluation.

The "summary" label of this final section is deemed appropriate in that a number of summative type observations and judgments have already been made in both Sections I and II, particularly in the latter. In this section, probable effects on major consumers of, and organizations related to, LER will be examined. "Probable" serves as a suitable caution given the one-group ex post facto nature of this evaluation. A final, closing discussion then briefly considers the strengths and weaknesses of LER and makes a few recommendations for future operations.

A. Probable Effects on the University of Colorado

The major probable effect of LER on the University of Colorado is quite real and tangible, namely the program development effort. As already discussed, several new courses were added, existing courses were revised and altered drastically, computer applications became apparent, etc. At best, any prior program area that might have been termed "research methodology" was marginal. Now, however, LER is recognized locally (as well as nationally) as a strong, vital program in the School of Education -- many observers (including this one) consider it the strongest educational program in the School of Education. This development and rise to prominence occurred in a relatively brief period.

In a less dramatic way, one can also consider the federal funds that were received by the university for program development and trainee support -- the accumulated total of over $400,000 in seven years is substantial.

Finally, another probable (and very real) effect of the program has been establishing and maintaining a particularly effective team of research methodologist nurturers. The team of Glass and Hopkins has had substantial and positive effects on an ever-increasing number of students, faculty, and other members of the educational community. (Although not as well known as Rowan and Martin, their humor is cleaner and substantially less funny.)

B. Probable Effects on University of Colorado Faculty and Students

Responses to interview questions (A-6, A-7, B-7, and B-10, Appendix B), questionnaire items (30 and 31, Appendix A), and data in the archives all suggest that LER has had a substantial effect on some personnel within the University.

Particularly and positively influenced have been School of Education graduate students. Via course work, research internships, and personalized consulting, the quality of theses for such students and their general research sophistication has undoubtedly advanced over pre-LER levels. This effect is likely substantial and should not be minimized.

The influence and impact of LER on School of Education faculty has been disappointing and markedly below hoped-for and intended levels. Although several have monitored basic research courses, research productivity has not changed substantially. Although consulting with education faculty has increased somewhat over the LER years, such assistance seems to facilitate the professor's work, but the work typically is not a research product. There are, however, a few School of Education faculty who have been directly and materially assisted by

LER in doing substantial research -- these exceptions stand out. Further, many School of Education faculty now advise their graduate students to use the facilities of the Lab. This advice to students demonstrates awareness of the service, but at times is irksome as research methodology instruction for the professor himself via consulting or course-monitoring would seem as, or more, appropriate.

LER's probable effect on faculty and students outside the School of Education has been less substantial than for educational faculty and students. As already noted, the press for consulting services forced LER to limit access to the service. Consulting off-the-street with such groups correspondingly has dwindled considerably. Some students from other departments (e.g., psychology) still are indirectly effected by enrollment in courses taught by LER staff.

C. Probable Effects on LER Students

The primary most visible product of the LER program are the LER students themselves. First and foremost, the program was initiated to develop persons "to stimulate and conduct research studies focused on important aspects of education."

Perceptions of LER staff (questions B-5 and B-17, Appendix B) and past and present students (items 16 and 34 through 38, Appendix A) for the most part indicate positive and substantial effects of the program on LER students. Students who have completed agreed that the program met their expectations. On balance, they perceive themselves as better trained than their present non-LER colleagues (1.7 on a 1 to 5 scale from "superiorly trained overall" to "inferiorly trained overall") and ascribe this better training posture primarily to LER (4.4 on a 1 to 5 scale from "not at all" to "to a great extent"). Further, asked to speculate how successful they would now feel had they completed a

graduate program other than LER, they indicated probably less successful (1.8 on a 1 to 5 scale from "less successful than I now feel" to "more successful than I now feel"). They did not express a great need for retraining at this time (2.3 on a 1 to 5 scale from "not at all" to "to a great extent"), but did indicate a need for further training (2.5 on a 1 to 5 scale from "to a great extent" to "not at all"). Areas mentioned most frequently for necessary additional training were, in order of frequency, multivariate analysis, advanced statistical techniques, and evaluation.

So, even with the limitations of testimonial self-report data, let us assume that the LER training program did have substantial effects on its graduates. A second question then looms significant. Did the obtained effect address directly the principal objective of the training program, that is, developing persons to stimulate and conduct research studies focused on important aspects of education? The answer to this question is not easily obtained. Can a case be made that many LER graduates are more service-oriented ("service" in the sense of assisting others to conduct their studies better) than research-oriented? If so, does such service constitute an important element of the "stimulation" sought in the major objective? Is the present LER training model too service-oriented -- how often do trainees see and work with Drs. Glass and Hopkins when the staff are wearing their service hats? -- their research hats? -- their evaluation hats? Is the desired LER graduate a research-methodology service-technician or a scholar? These are difficult questions meant for staff and student reflection, particularly appropriate if questions of possible new directions are examined. Some information in the section immediately following also bears on the questions raised.

D. Probable Effects on the Field of Educational Research

A series of interview questions (A-16, A-18, B-17, and B-18, Appendix B) and items on the questionnaire (40 through 41, Appendix A) addressed the question of likely effects of LER and its graduates on the field of educational research. Former students did not particularly believe that they were producing research critical for the field (2.5 on a 1 to 5 scale from "not at all" to "to a great extent"), but they did see themselves working in major problematic areas in education (e.g., integration, accountability, etc.) to some extent (2.5 on a 1 to 5 scale from "to a great extent" to "not at all").

LER faculty perceived students more involved in major problematic areas than did the students themselves. One staffer expressed his opinion that although several LER graduates had become involved in a problematic area, it was likely an accident of employment and not due to any feature of the training program. Incidentally, LER staff in citing examples of former students with heavy problematic-area-involvement mentioned only fellows employed in non-professorial roles.

On the question of whether graduates were producing research critical for the field, LER staff split (2 and 4). "Critical" sets a high standard and, in balance, one can point to few products of LER graduates that meet such a criterion. LER staff felt that possibly two or three of the quarter-hundred LER graduates might eventually produce such critical research. The areas mentioned as most-likely-to-be-produced were primarily concerned with research methodology rather than a content-area discipline. This observer agrees that little has been produced by graduates to date that merits the "critical" label.

E. Overall Probable Effects of the LER Training Program

Data of relevance here came from the archives (e.g., AERA Task Force Report No. 16, never published, but years in the PERTing that compared research training programs), interviews (question A-17, Appendix B), and questionnaire feedback (items 42 and 43, Appendix A). Compared to other programs of a similar nature, LER was perceived as clearly above average (4.5 by staff and 4.1 by students on a 1 to 5 scale from "distinctly inferior" to "distinctly superior"). The list of programs cited as superior to LER (e.g., Stanford, Berkeley, Chicago) was short. This observer would place LER in the top decile of research training programs in the country.

Compared to doctoral programs generally, the LER program was regarded even more positively (4.5 by both staff and students on a 1 to 5 scale from "distinctly inferior" to "distinctly superior"). Agreed. At the same time, this observer detects a hint of slippage in the data he has examined -- that is, the perceived "superiority" of LER may be somewhat lower now than earlier in its existence.

Of interest, too, in the overall perspective, is the cost-benefit posture of LER. By making a few gross assumptions, at least some statements can be made. Assume that $600,000 represented the total cost of LER ($400,000 directly from federal grants and $200,000 from other federal and state sources). Assume also that 75 percent of these funds, or $450,000 went for direct training of fellows. Finally, assume that 30 fellows had been graduated from LER -- the 25 completers, plus 2 near-completers, plus a group in the pipeline equivalent to over three FTE graduates.

This places the cost of training at $15,000 per graduate, a seemingly "fair" estimate. Present evidence suggests that nearly all graduates will remain in the field; let's assume that 80 percent do and that each works 30 additional years.

This amortizes the cost to about $625 per graduate -- year of research, teaching, and service in the field [$450,000 ÷ (30 graduates X 80 percent X 30 years)]. A bargain, you contend -- a bargain, I agree.

F. Strengths, Weaknesses, and Probable Future of LER

LER continues to maintain its three main strengths: (1) key professional staff, (2) bright,motivated students, and (3) provision for considerable interaction between staff and students. These strengths of the Lab are real -- not to be taken lightly -- and not to be taken for granted.

There are, however, here and there, indications that the vitality of LER in 1973 is somewhat below that in 1969 -- esprit possibly not quite so high (both student and staff), internal communication not quite so good, core curriculum and experiences appearing not quite so relevant, etc. It is difficult to estimate the effect on LER of the changing job market (essentially a tight construction of the professorial opportunities) and reduced funding for research training and, seemingly, for research itself. Lack of student support funds concerns one LER staff member considerably -- he believes such a shortage has and will increasingly manifest itself in the form of fewer applications to LER, less qualified trainees, self-selection to LER if having access to own personal support funds, etc.

The 1973-1974 academic year is a pivotal one for LER. Dr. Glass is on creative leave and reflecting on his appropriate university-LER role. Dr. Worthen has just departed from the Lab. Federal support of trainees has terminated. Though all nine current trainees are financially supported via a patchwork combination of university fellowships, teaching assistantships, and working internships, certainty of their funding in 1974-75 is far from assured. The job

market for which LER was created is currently assuming a very low profile. A new physical location for LER is daily becoming less a rumor and more a source of uncertainty (as to potential effect on LER).

This evaluator is of the opinion that LER as it was conceived has peaked, and that substantial and important progress was made in terms of attaining the objectives set forth in 1965. Good show -- really first rate.

This evaluator is also of the opinion that the long range future viability and vitality of LER is linked to a careful reanalysis now of the total program and the apparent national need, and reconceptualization to include new or modified objectives as appropriate. Possibly research in substantive content fields should be launched. Possibly student input should be reduced to better match resources available (both financial for student support and faculty time resources for interactions with students). Possibly consulting off-the-street should be abandoned or modified in the interest of better training. Possibly basic features of the present LER model should be abandoned or modified. Possibly all the possibilities I've mentioned above should be reversed.

Nevertheless, the truly major accomplishments of LER over the past seven years stand -- they are a matter of record. It is possible that the next seven years might be as productive and filled with accomplishment as the last seven even with no significant changes in the LER training model. I would, however, be surprised if that occurred. With the prior excellent posture of LER in regard to considered, reflective response to evaluative data, I am comfortable in the belief that a formal reanalysis of need, objectives, and program would result in a stronger LER over the long haul (even if, by some quirk, the decisions ultimately reached left the present LER training model virtually intact).

APPENDIX A

LER QUESTIONNAIRE TO PAST AND PRESENT FELLOWS; SUMMER, 1973*

Respondent _____ Present Position and Location _____

Please answer the following 44 questions; most require only circling a number on a value scale. Your comments on any item are welcome. (We ask for your name only to enhance our chances of obtaining complete returns; your specific responses will, of course, be kept confidential.)

1. Please rank the following ten activities according to your present opinion of their educational value for you. (Give a rank of 1 to the activity of most value, etc.)

Activity	Rank	Emphasis	COMMENTS
1. Brown Sack seminars.	___	_____	
2. Comprehensive exams.	___	_____	
3. Consulting: faculty-directed projects such as Title I, Task Force, State Assessment, or Title III evaluations.	___	_____	
4. Consulting: off-the-street (other-than-LER graduate students and faculty; that is, from Education and other disciplines).	___	_____	
5. Course work.	___	_____	
6. Dissertation.	___	_____	
7. Faculty-fellow interactions (informal; collaboration on faculty-initiated projects).	___	_____	
8. Fellow-fellow interactions (bullpen activities).	___	_____	
9. Independent study or reading.	___	_____	
10. Self-initiated projects (independent or in collaboration with other fellows, with or without faculty advice).	___	_____	

2. Please rate (in the Emphasis column) the above 10 activities according to this key.

+ I overemphasized it during my LER years.

0 I emphasized it correctly during my LER years.

- I underemphasized it during my LER years.

N.A. Not applicable.

* Please return completed questionnaire to Dr. William L. Goodwin, Laboratory of Educational Research, University of Colorado. Please return as soon as possible and no later than Sept. 7. Please include a current vita.

LER QUESTIONNAIRE TO PAST AND PRESENT FELLOWS; SUMMER, 1973

The next four questions refer to individual faculty members; your responses will be held in confidence.

Please circle the name of the faculty member who was your dissertation adviser. KEY: H = Hopkins, G = Glass, W = Worthen, Other (specify) _____.

COMMENTS

3. It was difficult to see him about professional questions. (Circle only for applicable faculty.)

	strongly agree				strongly disagree
H	1	2	3	4	5
G	1	2	3	4	5
W	1	2	3	4	5
Other (specify) _____	1	2	3	4	5

4. Guidance for course and degree planning was: (Circle only for applicable faculty.)

	restrictive				vague
H	1	2	3	4	5
G	1	2	3	4	5
W	1	2	3	4	5
Other (specify) _____	1	2	3	4	5

5. Dissertation guidance was : (Circle only for applicable faculty.)

	restrictive				vague
H	1	2	3	4	5
G	1	2	3	4	5
W	1	2	3	4	5
Other (Specify) _____	1	2	3	4	5

6. I gained a great deal professionally through informal interaction with:

	strongly agree				strongly disagree
H	1	2	3	4	5
G	1	2	3	4	5
W	1	2	3	4	5
Other (specify) _____	1	2	3	4	5

7. LER faculty should know more about School of Education and Graduate School requirements.

strongly agree				strongly disagree
1	2	3	4	5

8. Social contacts between LER fellows and faculty should:

increase				decrease
1	2	3	4	5

9. Social contacts among LER fellows should:

increase				decrease
1	2	3	4	5

LER QUESTIONNAIRE TO PAST AND PRESENT FELLOWS; SUMMER, 1973

Please check the year you entered LER: 66___, 67___, 68___, 69___, 70___, 71___, 72___

10. Older fellows helped orient new fellows: a great deal 1 2 3 4 5 very little COMMENTS

11. I received help from other fellows on: often seldom

course work	1 2 3 4 5
course planning	1 2 3 4 5
degree requirements	1 2 3 4 5
professional problems	1 2 3 4 5
client problems	1 2 3 4 5

12. Informal interaction with LER fellows was: valuable 1 2 3 4 5 not valuable

13. Please rate the following changes made in LER procedures. (Circle NK if you have no knowledge of the change.)

a. Making a fellow the coordinator of client appointments. success (good idea) 1 2 3 4 5 failure (poor idea)

b. Making a fellow the coordinator of brown sack seminars. 1 2 3 4 5

c. Requiring 400 (rather than 600) hours of internship. 1 2 3 4 5

d. Having a faculty member sit in on client intake interviews. 1 2 3 4 5

14. Clients of LER were:

a. well-prepared	1 2 3 4 5	ill-prepared
b. benefitted	1 2 3 4 5	not benefitted
c. grateful	1 2 3 4 5	ungrateful

15. On client's projects which were too difficult for them to design and analyze, I found myself assuming much of the work. agree 1 2 3 4 5 disagree

16. The professional preparation of the LER program met my expectations. agree 1 2 3 4 5 disagree

17. Physical facilities of the LER were: adequate 1 2 3 4 5 inadequate

18. Stipends were: adequate 1 2 3 4 5 inadequate

Internship (generally) was: relevant 1 2 3 4 5 busywork

LER QUESTIONNAIRE TO PAST AND PRESENT FELLOWS; SUMMER, 1973

19. How many _____

	know well	acquainted with	COMMENTS
a. Education graduate students (non-LER)	_____	_____	
b. Professors in School of Education (non-LER)	_____	_____	

20. LER needs closer ties with the School of Education. Strongly agree 1 2 3 4 5 Strongly disagree

21. Please list major projects (e.g., Title I, State Assessment, Task Force, Title III evaluations, etc.) on which you worked (i.e., spent more than 40 hours) during your years at LER.

22. Please list titles and dates of any papers, publications, and research projects completed (or in progress) while you were a LER fellow. (Use reverse side if more space is necessary.)

	Completed		In Progress	
a. Collaboration with LER faculty	Title	Date	Title	Date
	_____		_____	
	_____		_____	
b. Collaboration with LER fellows	_____		_____	
	_____		_____	
c. Collaboration with students in School of Education	_____		_____	
	_____		_____	
d. Collaboration with others (specify whom)	_____		_____	
	_____		_____	
e. By self	_____		_____	
	_____		_____	

COMMENTS

23. Please list your present professional memberships and activities (national offices held, national or regional committees served on, etc.) within those organizations.

_____

_____

_____

_____

_____

_____

24. Please rank order at least 5 major highlights of your LER years; e.g., projects, publications, specific guest professors, etc. (Give rank "1" to the highlight considered most important, etc.)

Rank 1 _____

Rank 2 _____

Rank 3 _____

Rank 4 _____

Rank 5 _____

25. The LER "Core Curriculum" in research methodology and statistics contained (or was):

too much math 1 2 3 4 5 too little math
too theoretical 1 2 3 4 5 too applied
poorly designed 1 2 3 4 5 well designed
too little freedom 1 2 3 4 5 too much freedom

26. Considering your present perspective and role (or role-plans), do you feel that the LER curriculum contains too much or too little emphasis on evaluation methodology (as distinct from research methodology):

too much emphasis on evaluation 1 2 3 4 5 too little emphasis on evaluation.

27. Assume that all constraints were removed and you could now take a new position (or retain your present one, if that were your choice). Rank order in the left column below from "1" highest to "9" lowest the following occupations on the basis of your own preference for them:

COMMENTS

27. Your Own Rank	Occupation	28. LER Directors' Rank
_____	Research and development in a private or quasi-public firm (e.g., National Assessment, ETS, SRI).	_____
_____	Research and development in a Regional Laboratory.	_____
_____	Research and development in an R & D Center.	_____
_____	Research and teaching in a small (less than 4,000) college or university.	_____
_____	Research and teaching in a large (10,000+) university.	_____
_____	Research director in a large city school system.	_____
_____	Coordinator for a state education department.	_____
_____	Research on an independent, free-lance basis (i.e., self-employed researcher taking contracts of interest, but not one who is university -- or organization -- based).	_____
_____	Teaching only in a university.	_____

28. Rank order -- from "1" highest to "9" lowest -- the occupations in item 27 in the right column on the basis of what you feel the LER Directors would like you to prefer.

29. Items 27 and 28 assume, for the most part, that you would prefer an occupation that includes a heavy research component. This may not be the case. Rank order -- from "1" highest to "3" lowest -- the following areas in terms of your preference for working in them.

Rank	Area
____	Development
____	Evaluation
____	Research

30. To what extent do you feel that the LER program -- faculty and fellows -- has influenced (in a positive sense) the following groups:

COMMENTS

a. School of Education graduate students. Not at all 1 2 3 4 5 To a great extent

b. School of Education Faculty. Not at all 1 2 3 4 5 To a great extent

c. University of Colorado graduate students and faculty outside the school of education. Not at all 1 2 3 4 5 To a great extent

31. Estimate the percent of your total time with LER that you spent (note: in the item, "consulting" does not include running or programming data-analysis computer routines):

____% Consulting with education graduate students.

____% Consulting with education faculty.

____% Consulting with non-education graduate students.

____% Consulting with non-education faculty.

____% Programming or running data-analysis computer routines for LER clients (as distinguished from, for your own studies).

32. Had the LER training model been focused primarily around a continuing large-scale research project experience for trainees (rather than as it was), do you feel that you would have been:

better trained overall 1 2 3 4 5 poorer trained overall

33. To what extent do you feel weakly, poorly, or inadequately trained in a specific discipline or content area (as distinct from training in research methodology/statistics content)?

to a great extent 1 2 3 4 5 not at all

34. In your present occupational role, compared to your non-LER colleagues, how would you rate yourself?

superiorly trained overall 1 2 3 4 5 inferiorly trained overall

35. To what extent do you believe that your answer in #34 is due to your LER program training (as distinct from being due to other training, self training, etc.)?

Not at all 1 2 3 4 5 to a great extent

COMMENTS

36. Speculate as to how "successful" you would now consider yourself had you taken a graduate program other than that offered by LER ("successful" in an overall, general sense, including occupational role, life style, etc.).

less successful than I now feel 1 2 3 4 5 More successful than I now feel

37. a. To what extent do you feel the need for <u>further</u> <u>training</u>, at this point in time?

to a great extent 1 2 3 4 5 Not at all

b. Specify, in rank order, those areas in which you most feel the need for <u>further</u> <u>training</u> (rank as "1" your highest need, etc.):

Rank 1 _____

Rank 2 _____

Rank 3 _____

38. To what extent do you feel the need for <u>retraining</u> (i.e., training in a new field), at this point in time?

Not at all 1 2 3 4 5 to a great extent

39. To what extent do you believe that it is important for LER students to publish formal papers <u>during</u> their training program?

to a great extent 1 2 3 4 5 not at all

40. To what extent do you believe that <u>you</u> have produced research critical for the field?

not at all 1 2 3 4 5 to a great extent

41. To what extent do you believe that <u>you</u> are working in major problematic areas in education today (i.e., integration, alternative schooling, accountability, etc.)?

to a great extent 1 2 3 4 5 Not at all

42. Overall, how would you rate the LER training program compared to other training programs in the same area (i.e., research methodology and statistics)?

distinctly inferior 1 2 3 4 5 distinctly superior

COMMENTS

43. Overall, how would you rate the LER training program compared to other doctoral programs generally (i.e., in all fields)?

distinctly inferior 1 2 3 4 5 distinctly superior

44. Please describe any deficiencies that you perceive in the LER program, as well as any suggestions that you have for improvement of the LER program.

Please return completed questionnaire to Dr. William L. Goodwin, Laboratory of Educational Research, University of Colorado. Please return as soon as possible and no later than Sept. 7. Please include a current vita.

APPENDIX B

QUESTION SETS USED WITH LER PRINCIPAL STAFF; FALL, 1973

A-1 : Over the seven-year history of LER, there have been several drop-outs; is it possible for you to characterize the drop-outs as a group (i.e., did they have common characteristics)?

A-2 : For several of the early years of the Lab, monies were received to develop the research methodology program. Comment upon the present program as compared to the situation existing before LER was initiated.

A-3 : Has the effort you have expended in developing and operating the LER model been worth it or not? Elaborate.

A-4 : Rank order the importance or weight of the following LER entrance criteria. (Give a rank of 1 to the most important, etc.)

1) GPA
2) GRE
3) Math background
4) Commitment to educational research
5) Endorsement from known, reliable source

A-5 : Do the high entrance criterion for LER students have any undesirable consequences?

A-6 : To what extent do you feel the students of the School of Education have been influenced by LER? Be specific in detailing examples of this influence.

A-7 : To what extent do you feel the faculty and students in departments other than education have been influenced by LER? Be specific in detailing examples of this influence.

A-8 : Comment on how you would view the following in terms of appropriateness for the LER training model:

1) a large scale research project in which students could be actively involved.
2) increased internships with "applied" agencies, that is, public schools, state departments, and the like.

A-9 : Should LER students be required to do a small research project from conceptualization to completion?

A-10: How important is it that LER fellows teach while earning the Ph.D.?

A-11: Do you view the LER student of today, as compared with 1966, as taking more or fewer offerings in the various behavioral sciences?

A-12: At one point, internships were reduced from 600 to 400 hours. What do you view as the benefits and consequences of this change?

A-13: Have you noticed a shift in where LER graduates are employed?

A-14: Assuming that the current trend toward difficulty in finding student support funds continues, what effect do you predict this will have on the LER program and students?

A-15: To what extent do you feel that LER students are handicapped by their lack of concentration in a substantive area (i.e., an area other than research methodology itself)?

A-16: To what extent are LER students in touch with the major problematic areas in education today (i.e., integration, alternative schooling, accountability, etc.)?

A-17: In your opinion, and considering similar programs to LER across the country, how would you rank the LER program in terms of its contribution to the field of educational research?

A-18: To what extent do you feel that LER graduates have or will become leaders in the field of educational research, broadly conceived? (be specific, that is, how many do you feel will attain what level of prominence?)

A-19: What do you perceive as the greatest weakness of LER? The second greatest weakness?

B-1 : At the outset of LER in 1966, it was envisioned that several departments, other than education, would be meaningfully involved in the LER student's program. To what extent do you feel such inter-disciplinary liaison has been achieved and also comment on the value of such liaison?

B-2 : Early in the life of LER, it was anticipated that there would be 24 students training at a single time in the Lab. If such a number had been attained, what do you view as the likely benefits and consequences?

B-3 : To what extent do you feel the success of the LER program has been dependent upon recruitment? Upon high entrance standards?

B-4 : To what extent do you see LER as being vulnerable to the charge of academic "elitism"? What positive aspects has such "elitism"? What negative aspects?

B-5 : Speculate on how successful LER students would have been after completing the Ph.D. if they had completed it in an area other than LER.

B-6 : To what extent do you feel that the internships (608, 609, 610, 611) are critical for the LER program?

B-7 : To what extent would you estimate LER students are involved in the following activities via their internships? Estimate for both early Lab (say, 1966-68) and late Lab (say, 1971-73).

1) Consulting with graduate students.
2) Consulting with faculty.
3) Running data analysis computer routines.

B-8 : Comment upon the nature of your personal involvement with your students, that is, its duration, its intensity, its merit, etc., particularly as compared to involvement with students displayed by other faculty.

B-9 : Trace the history of the brown sacks. Have they recently been what you want them to be?

B-10: To what extent do you feel the faculty of the School of Education have been influenced by LER? Be specific in detailing examples of this influence.

B-11: At times, the School of Education faculty have expressed concern about the accessibility of LER given its location in the Education Annex. Some have suggested that it be moved to Hellems Annex. What is your reaction to this suggestion?

B-12: Do you notice a trend in terms of the number of LER students who leave the program for employment before completing their dissertation?

B-13: To what extent do you perceive major changes in the competencies acquired by a LER student as he completes the Ph.D.?

B-14: Several students in reflection feel they would have gained via more time (i.e., another year) in LER. How do you feel?

B-15: Should LER students be involved in preparation of research proposals for funding?

B-16: To what extent do you feel that it is important for LER students to publish formal papers before completing the Ph.D.?

B-17: To what extent do you feel that the faculty and students of the LER have produced research critical for the field?

B-18: What would you view as LER's overall impact on the field of educational research? Estimate what LER's impact is likely to be 10 years from now.

B-19: What do you perceive as the greatest strength of LER. The second greatest strength?